MEDICAL REPOSITORY.

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ARTICLE I.

Singular Case of ISCHURIA: *Communicated by Dr.* WILLIAM PARKER, *of Charleston (South-Carolina), to Dr.* MILLER.

ON the 4th of November, 1801, Mr. Abraham Markley, a young gentleman of this city, aged eighteen years, usually in high health, and of a habit promising to be muscular, was affected with suppression of urine, accompanied with pain in the lower part of the abdomen, and this particularly violent on any effort to pass urine. For three weeks preceding, he thought he had voided it with some uneasiness, and in a smaller stream than usual. He could assign no cause for these symptoms, though it was ascertained, in the subsequent course of his disease, that he had, shortly previous to any affection, exerted himself in climbing up a rope, by the action of his hands and legs, the rope passing in a line down his body, and between his thighs; and further, that he had exercised himself in running and jumping over a fence. His pulse and tongue were in a natural state, the belly slow, appetite not yet impaired, and the urine natural in colour and transparency; nor were there any affections in the neighbourhood of the kidneys.

He took, during the first day, some aperient and diuretic medicines, as also some moderate anodyne doses, and went repeatedly into the warm bath. In the evening, the first of these had operated slightly, but without relief to any of the symptoms. The injections which were given to ensure their passage through the bowels were generally received but partially, and with pain, and for the most part instantly and forcibly rejected. He had voided no urine during the day. The pain in the abdomen was increased. Pressure about the region of the pubes more and more intolerable. Much tension ob-

servable along the course of the linea alba, and a slight tumefaction below the umbilicus, inclining to the left; pulse now full but soft.

He was now blooded, and the catheter introduced. No resistance in the course of the urethra, and perhaps less than natural at the neck of the bladder. Not more than one ounce of urine, of an ordinary appearance, came off; not, however, without sensible relief. He was directed to continue his medicines, and the bath or fomentations as before, unless ease and consequent sleep should render them inexpedient through the night.

5th. The pain recurred soon after leaving him last evening. No discharge of urine during the night. No rest. Eight ounces of urine drawn off by the catheter in the morning, and the same quantity at noon. Not more than two ounces came off in the evening. His medicines and other applications through this day the same as yesterday.

Evening. Every symptom aggravated; venesection proposed, but not submitted to.

6th. About day-light, after a distressing night, he suffered twenty ounces of blood to be taken away. About eight ounces of urine came off spontaneously, which, in this solitary instance, rendered unnecessary the use of the catheter. At the joint request of Dr. Noble and myself Dr. Baron was called to visit him at nine A. M.

Some relaxation of the tension down the linea alba having taken place, a circumscribed tumour could now be clearly felt, reaching above the umbilicus, and extending considerably on each side, but most perceptible on the left. A large blister was applied between the umbilicus and the pubes, and the saline medicines continued through the day.

7th. Has passed some urine in the night, but is now unable to retain it. No other evident relief. Belly bound. Much distressed with pain in the body of the tumour. Took cathartic medicines, which procured some evacuations, and at night the same combined with anodynes.

8th. Costive. Urine evacuated occasionally, though somewhat sparingly. Great distress in the abdomen generally, apparently caused by accumulation of fæces. Injections came away as injected, and were thought to induce a distressing tenesmus from continued repetition. The tumour on the increase.

A cathartic mixture was given at intervals through the forenoon, to no purpose, and in the afternoon strong doses of pills

of jalap and calomel. Evacuations followed sufficient to ward off present danger, and to justify the exhibition of moderate anodyne doses, so urgently called for by frequent fits of pain, and inability to sleep. The tumour undiminished, though somewhat less painful on pressure.

9th. The bowels, though not obstructed through this day, yet slow. The purgative medicines continued, and at night again indulged with a moderate anodyne.

10th. A bad night. Fœcal evacuations still continue, but have become remarkably fetid and bilious, accompanied with other appearances leading to apprehend typhous debility. Urine passed naturally, though rather scantily. The tumour rather increased. Took this day his purgative medicines in a light decoction of bark.

11th. Costive. Injections distress him more than ever. Tumour enlarged. Took, through the day, six doses of strong cathartic pills, and sixteen ounces of a cathartic mixture.

12th. No evacuations. Stomach retains nothing; fæces appear diffused with what was ejected. Tobacco smoke, by injection, was now tried without obvious or immediate benefit. Enormous fœcal vomitings during the forenoon exhibited this formidable case in its most shocking form. The warm bath was ordered.

At this crisis, when the attending physicians were about retiring for further consultation, the patient requested that Dr. L. S. a French gentleman in much estimation, might be called to his assistance. The subsequent management of the case devolved principally upon him. On this account, and as the disease soon after became a chronic affection, daily notices of it were omitted.

The case being now considered as *hernia ventralis*, a correspondent treatment was adopted and carried to the utmost possible extent. He continued in the warm bath several hours at a time. Evacuations were solicited by injections, with the cassia fistularis dissolved in them, and by purgatives least apt to irritate. They came on, bringing relief from the vomitings as well as from the general pain in the abdomen. This plan was continued for two or three days, not without sanguine hopes of success; yet it was discouraging to perceive the tumour still on the increase. A tympanitic affection, which was before observable, in a slight degree, soon became the most urgent symptom, and diffused itself over the whole abdomen, presenting an uniform enormous swelling, tense, elastic and sounding. The warm bath was then desisted from, and tonic, evacuant

and carminative medicines again had recourse to, with the effect of removing, in a great measure, the tympanites. Thus the fine constitution of our patient unexpectedly withstood this second shock; though it was only to show us what further variety of suffering an originally good frame, unbroken by intemperance, might endure before it finally yields. On the subsiding of the tympanitic swelling the original tumour came again into view, still larger than before. Several attempts were made to effect a radical cure, according with various views which were at different periods taken of the disease. Among these, after a consultation with Dr. Polony, who first discovered evident fluctuation in the tumour, (by that time grown so large as to come for a considerable extent in contact with the parietes abdominis) tapping was put in practice. On this occasion about half a gallon of *urine* flowed off freely, when, on a sudden, the discharge stopped, and an inexpressible anxiety and pain were diffused over the whole internal abdomen. These, however, gradually lessened during the two or three succeeding days; but at the same time the tumour was reappearing, and on its having gained its first size, his sensations were in their former state. An elegant preparation of the digitalis, prescribed by Dr. Polony, was tried to no purpose; nature began to flag in her resistance to six or eight weeks of unremitted pain, and the want of due action in an important organ; debility and emaciation increased daily; and the treatment was latterly only with a view to palliation.

He was now attacked with a distinct series of inflammatory symptoms, acute pain in the right lumbar region, inability to lie on that side, feverishness, &c. which continued, without being materially relieved, through the remainder of his illness. While these were yet progressing, he perceived, as he thought, something to burst within him, on the left of the tumour, giving him sensible relief; after which, a circumscribed part near the spot was very discernible to be much softer than elsewhere. The last affection, in this case, was an inability to move the limbs of the right side, which had continued two days, when death put a period to his miseries.

DISSECTION.

On laying open the abdomen, the bladder presented itself greatly distended, and reaching half way up between the umbilicus and the scrobiculus cordis. Below the umbilicus a strong adhesion existed between it and the peritonæum, by a circular space of about three inches in diameter. In this, how-

ever, no inflammatory discolouration remained. Through this adhesion the trocar had passed; of course he was not disturbed by urine in the abdomen. On the left of the bladder, immediately corresponding with the soft spot discovered on the abdomen before death, a protuberance appeared, which being opened, was found to contain about one ounce of urine, in a chamber, formed between the outer and middle coats of the viscus, and communicating with the main cavity by an orifice capable of admitting a small quill. In the latter were found upwards of three quarts of urine, of a common appearance. After it was completely emptied, and wiped with the sponge, it was soon found to be filling afresh, and this repeatedly; the supply coming from the orifice of the right ureter. While dissecting, with a view to the examination of the kidney, the knife passed suddenly into a large sac, lying adjacent to that viscus, on the right side, containing upwards of a quart of urine. Considerable marks of inflammation appeared in the neighbouring parts, and some pus was lodged at the bottom of the cavity. The kidney itself was paler than usual, and more flaccid; its pelvis (then collapsed) not evidently enlarged, but having a communication between its cavity and that of the sac. The bladder was thickened, and of harder texture than common, though it could not be decidedly pronounced to be in a schirrous state; if by this term, so often applied to diseased bladders, be meant an affection of the same nature with schirrous glands.

From these appearances after death, and from the order of the symptoms previous to it, it cannot be doubted that the cyst near the kidney must have been formed by a rupture of the inner coats of its pelvis, and consequent distension of its outer coat: This was a necessary consequence of the bladder's having reached its greatest possible distension, and so resisting the further influx of urine secreted in the kidney. We need only suppose the coats of the bladder here, whether from disease or naturally, stronger than those of the pelvis of the kidney, to account for the rupture not first taking place in the former, as most commonly happens.

This cyst, however, being limited in its distension by the neighbouring parts, while yet the secretion of urine was still going on, it is evident that fresh outlets must have been forced by mere mechanical causes: and thus we find another of the same kind formed upon the bladder itself, and which was on the increase when death occurred.

Divested of these adventitious circumstances, the case re-

solves itself into some original affection of the bladder. But what this may have been, after all the display of dissection, is perhaps yet matter of mere conjecture.

1. Was it originally a paralysis of the muscular fibres of the bladder, and this accompanied with inflammation of the external coat,* causing the adhesion: and again this last proving an insurmountable obstacle to any recovery from the paralysis, which the youth of the patient would have entitled him to expect?† It is true, however, that adhesion is not always necessary to such an incurable state of the bladder; as from dissections,‡ similar fatal cases have occurred without adhesion; yet they were in aged subjects, among whom such affections may be expected from the beginning to proceed from bad to worse. If I might hazard an opinion, it would be, that but for the adhesion, a recovery would, in this instance, have taken place. Does Surgery or Physic furnish us with any means of destroying these?

2. In the late stages of these cases, when the patients passed an ordinary quantity of urine, why did not this still continue flowing, seeing the will of the patient coincided? No obstruction existed about the neck of the bladder or in the urethra, and the pressure of the neighbouring viscera, as well as that from much condensed air, must have been considerable.

3. Would the continued use of the catheter be of any avail in such cases? It is regretted that our patient would not submit to the trial of it, which was actually proposed after the perusal of the cases quoted above. Yet it could scarcely have failed to excite fresh distress at the place of adhesion: nor does former observation favour its use but as a palliative. A man in the Pennsylvania Hospital, affected with inability to pass urine from a fall, had it drawn off daily for three months, at the expiration of which time he died. The bladder was found hard, contracted and thickened.

* Inflammation of the one coat, and palsy of the other, are not incompatible; for the same strain or overstretching which would injure the tone of a muscular fibre, applied to an adjoining membrane, must lay the foundation of inflammation in it.

† It is certain that the adhesion would prevent the natural and full contraction of the muscular fibres, which, thus kept for a long time over-distended, might lose altogether their disposition to it. Early in the disease, the patient said, that, on attempting to pass urine, he felt as if a wall were placed across his bladder, evidently a sensation arising from the adhesion resisting contraction.

‡ Vide Encyclopædia, art. *Ischuria vesicalis.*

ARTICLE II.

A short Account of the YELLOW FEVER *which appeared on Block-Island, in the Summer and Autumn of* 1801. *By* AARON COMSTOCK WILLEY, *Resident Physician there. Communicated by Dr.* M. FOOT.

BY the 2d of August ten persons were sick of the yellow fever: one of them died a few minutes after the arrival of myself and attendants on the island; the others were apparently upon the verge of dissolution. On the 6th another of the ten died. New cases were now daily occurring, and the disorder began to spread in various parts of the island, carrying great terror wherever it appeared.

The weather was uncommonly hot and dry. This state of weather, I was informed, had existed during several of the preceding months. Little or no dew was perceived to have fallen in the nights; vegetation was greatly injured; and the water drying from the ponds, left a considerable portion of their bottoms exposed to the action of heat. From these, and from the moist grounds, were constantly rising noxious miasmata, capable of affecting the olfactory organs to a great distance.

The fever continued to prevail, in a greater or less degree, till the middle of November, when it disappeared; but a few days of uncommonly warm weather excited two cases in the fore part of December.

On the 31st of August was a terrible thunder storm, such as the oldest inhabitants scarcely remember to have experienced. The electrical explosions were frequent and tremendous—the lightning dense and extensive. Its duration was nearly an hour. The rain was copious. At first I expected that this would suppress, or produce some favourable change in the epidemic. But I was unhappily disappointed. It continued to rage with unabated violence, and, if any thing, assumed a greater degree of malignity. The succeeding weather was not less favourable to its predominancy than that previous to the storm.

The degree of its prevalence may be conceived by the following statement. The island is calculated to contain seven thousand acres; one thousand or more of which is water. The number of inhabitants, by the last census, seven hundred and fourteen; of these about eighty were confined to their beds during a regular and severe course of the fever, besides a greater

number, who, by an early application, had it arrested in its first attack. What rendered this disorder more formidable, was the remarkable degree of health, and exemption from epidemics, for which this island has always been distinguished.

Whether this disorder was imported, or generated upon the island, is a question which admits of some dispute. It is generally believed, by the inhabitants, to have been imported, about the beginning of April. But their account of its importation is fraught with much ambiguity and difficulty. I am rather inclined to think that it was indigenous, originating from the impression of deleterious gases; that it first assumed its characteristic features some time in June, and that those few febrile cases which occurred prior to this period, were only the common inflammatory fever, not unfrequent in the vernal season. But accurate observations are wanting to determine this with any degree of certainty.

It prevailed among people of every age, but was more violent in those who were in the bloom of life.

"This disease put on all the intermediate forms between a mild remittent and a typhus gravior." In general, however, it was subject to three stages, readily distinguishable from each other. The *first*, or *synochal* stage, was marked with the following symptoms. Pain in the fore or back part of the head, accompanied with slight vertigo, and soreness of the eye-balls; pain in the back part of the neck, and in the bones; soreness of the flesh; vitiated taste; anorexia; rigors, succeeded by sudden flushes of heat; costiveness, and dry skin. These two last phenomena were, in a *few* cases, superseded by diarrhœa and diaphoresis. Eyes and skin of a yellowish hue; aversion to light, vigilance, and great dejection of spirits. In several instances I observed a remarkable loss of energy, and a constant tendency to leipothymia. Sometimes a retching and puking. These more frequently occurred in August. The matter ejected from the stomach was frothy, black, or green, highly bilious, and of an acescent smell. The pulse, for the most part, was small and tense; sometimes, however, I met with a pulse full and hard, and but rarely any soft; hurried respiration; oppression in the region of the præcordia; urine high coloured; tongue commonly moist and covered with a thick fur. In August this fur was purple, or black, sometimes yellow, and but rarely white. In September it put on a more uniform yellow, or white appearance. In one instance the tongue was of a fiery red, and interspersed with white specks. A burning sensation in the stomach, thirst, great heat, and florid coun-

tenance. In several cases I observed a confusion of intellects, but never a complete delirium. These symptoms were exacerbated towards evening.

If the fever was not dissolved in this stage, it was sooner or later succeeded by the *second*, or *typhoid* stage. Here the vigour of the system suffered a rapid declension. The pain of the head and other parts subsided; the pulse became weak, soft, and generally small, though sometimes full and sluggish; the face was less florid; retching, and an increased ejection of bilious matter from the stomach. In two instances the matter ejected was intermixed with blood. Flatulent distensions of the stomach and abdomen; the tongue became more livid, or black, generally dry and cracked, and sometimes glazed; cold sweat about the neck and forehead; faltering speech, turbid urine, lips and fauces generally dry and starchy; increased confusion of intellects; sighing; a deadly aspect, and great debility.

If the disorder did not come to a favourable termination in this stage, it passed into the *third*, or *sinking stage*. This was the great portent of approaching death. The pulse was extremely feeble and fluttering, heat greatly diminished, except about the *scrobiculus cordis*; the extremities became cold and livid, and a cold clammy sweat burst from every part of the body; the eyes appeared extremely glazy, the vigour of the system underwent alternate risings and fallings; subsultus tendinum, great inquietude, lying chiefly upon the back, sliding down in the bed, and sometimes feeble efforts to rise; laborious respiration, with frequent intermissions, injured deglutition, and an involuntary discharge of fæces. These fatal symptoms, rapidly increasing, generally closed the melancholy scene within twelve hours from the time of their accession.

The respective lengths of these stages depended upon the constitution, sex, age, violence of the disorder, and state of the atmosphere. The duration of the first stage was commonly from three to ten days; the second, from three to twenty-five, and the last not more than twelve hours.

Besides the phenomena already noticed, the following demand some attention:—

1. *Tinnitus aurium, and defect of hearing.* Though I sometimes observed these to happen in the first, yet they more frequently occurred in the second stage, and were in proportion to the debility of the system. They gradually disappeared with returning health.

2. *Diarrhœa.* This was commonly of the lienteric

species; it was confined to no particular period of the disorder. It sometimes occurred in convalescence, and greatly protracted recovery.

3. *Cough.* This was many times a concomitant, and frequently extremely troublesome. It was sometimes dry, at others humid. The latter was the most favourable.

4. *Glandular swellings.* In one case there occurred a swelling of the parotid glands. This was discussed. In two cases the disorder was followed by a tumefaction of the axillary glands. One of them terminated by resolution, the other in suppuration. A case of a young girl was accompanied with a phlegmonic tumor of the left breast, which ended in suppuration.

5. *Abscesses.* In one case the commencement of convalescence was attended with large abscesses upon the nates and inferior extremities.

6. *Intermitting pulse.* This frequently occurred in the latter part of August. In general it intermitted every third stroke. In two cases it intermitted every seventh stroke, in one every fifth, and in one the intermissions were irregular.

7. *Worms.* These were almost constant attendants; they were discharged in considerable numbers, and frequently crawled out of the mouth.

8. *Petechiæ.* I had but one case attended with petechial eruptions; they appeared on the twenty-eighth day of the disorder, and were the precursors of returning health.

9. Convalescence in one case was attended with great fatuity and mental derangement.

10. I saw two, who, in the sinking stage, appeared quite cheerful, and laughed but a short time before death. Dr. *Rush* observes, that this "frequently occurs in diseases which affect the brain and nerves."*

11. Two cases were succeeded by chronic rheumatism.

12. In females this disorder was generally followed by a *suppressio mensium.*

Having given a concise and accurate description of the phenomena of this disorder, I come now to consider the method of treatment, which I found to be most successful.

The indications of cure in the *first stage* were,

I. To moderate the synochal, or excessive action of the system.

II. To alleviate certain predominant symptoms which occasioned much distress to the patient.

* Account of the Yellow Fever in 1793, p. 75.

I. The *first* indication was most certainly answered,

1. By avoiding the application of artificial or accidental stimuli.

2. By diminishing the sum of natural stimuli.

3. By the exhibition of those medicines which tended to abate the febrile affections.

The artificial, or accidental stimuli, more immediately requisite to be avoided, were those of aliment, light, external heat, and the mental impressions.

The sum of natural stimuli was diminished by,

1. *Blood-letting*. This, when performed previous to the third or fourth day of the disorder, was attended with great efficacy. It mitigated pain, lessened indirect debility, and removed or obviated congestions in the brain. The appearance of the blood, when drawn, exhibited all the marks of an inflammatory diathesis. The quantity requisite to be taken away was determined by the violence of the symptoms, together with a consideration of the age and sex. In general, however, the evacuation was continued till the pain of the head in some measure abated, and repeated as often as it returned, till the time for bleeding was elapsed.

2. *Purging*. The effects of this were similar to those of blood-letting. It exonerated the intestinal canal of redundant and offending matter, abstracted excess of stimulus, and diminished the morbid excitement of the system. The most eligible purges were those of the drastic species. In August, and the beginning of September, I found calomel, combined with jalap, to answer the intended purpose; but when the season became more advanced, calomel with gamboge was commonly the most and only effectual medicine; they were given in doses sufficient to excite from six to ten alvine discharges, and reiterated till the primæ-viæ were thoroughly deterged. If they were tardy in their operation, they were expedited by laxative clysters. These were occasionally followed by others, or more gentle cathartics, in order to keep the bowels free of the reaccumulating bile.

3. *Vomiting*. This was necessary only when an accumulation of morbid matter was in the stomach, which cathartics did not readily remove. The administration of this, as it respected the particular condition of the patient, and species to be used, required considerable caution. In strong and robust constitutions, I used tartarized antimony with success, but in delicate and irritable habits, ipecacuanha was the only emetic I dared to trust.

4. *Subduction of heat.* As heat is a powerful stimulus in the animal system, its subduction became, of consequence, a matter of considerable importance. This was induced, *firstly*, by the application of cold, and, *secondly*, by the promotion of the cuticular excretion. 1. Cool air, and cool drinks were indispensably necessary. Of the last, cold water was the most beneficial; it was a great luxury to the thirsty patient. The face, neck and breast were frequently washed with cold water, and cloths wrung out of the same constantly applied to the bowels, and removed as often as they became warm. If pain occurred in the breast, stomach or bowels, vinegar was used instead of water; if this failed to give relief, cold fresh earth, wrapped in a thin cloth, was applied in the same manner. This last was of singular efficacy, and seemed to act upon the system with peculiar properties. 2. The cuticular excretion was promoted by a liberal use of diluent drinks, especially of vinegar whey.

The medicines which appeared best to abate the febrile affections were cream of tartar and nitre. From a free use of these I perceived the greatest benefits to accrue: they best answered the intended purpose when exhibited in solution, with a small addition of tartarized antimony.

II. The particular distressing symptoms which required alleviation, were,

1. *Violent pain in the head.* This generally yielded to the artificial evacuations, but often returned again with equal violence. When this was the case it frequently yielded to the application of cold water or vinegar, or if these failed, fresh earth. Epispastics to the nape of the neck were likewise of great benefit.

2. *Nausea and puking.* These were troublesome and sometimes stubborn symptoms. The medicines which I found to be of the greatest efficacy were tincture of opium, with elixir of camphor; columbo root in powder and infusion; julaps prepared with the essential oils of cinnamon, peppermint, and pennyroyal; external application of tincture of opium, and strong aromatic infusions, with a liberal use of the antiemetic drinks. If these symptoms depended upon morbid matter in the stomach, they yielded to gentle emetics and cathartics.

3. *Oppression and difficult respiration.* These were generally relieved by small and frequently repeated doses of camphorated solution of tartarized antimony.

The curative indications in the *second stage* were,

I. To support the declining vigour of the system.

II. To moderate the febrile affections.

III. To alleviate those predominating symptoms which occasioned much distress.

1. The vigour of the system was supported by both internal and external means. The internal exhibitions were infusions of castor and wild valerian, decoctions of Peruvian bark, brandy diluted with water, wine whey, elixir of vitriol, dulcified spirits of vitriol, compound powder of ipecacuanha; and in cases of extreme debility, when the sinking stage appeared to be near, wine, bark in substance, camphor, ether, and the above mentioned essential oils. The external applications were sinapisms to the bottoms of the feet, epispastics upon the wrists, ancles, the whole length of the shin, and over the coronal suture, washing the face, breast and stomach with vinegar or diluted brandy; and in the latter part of the stage in brandy alone. Besides these remedies I frequently excited a slight ptyalism by means of mild muriated quicksilver, given in small and repeated doses, and by anointing the right hypochondrium with unguentum hydrargyri. This was followed with the most happy effects, and never failed in but one instance to turn the trembling scale in favour of life.

2. The febrile affections were best abated by the spirit of nitrous ether. To render this a better diaphoretic, I commonly added a small portion of antimonium tartarisatum.

3. The predominating symptoms necessary to be mitigated were,

1. *Retchings and vomiting.* For these I usually employed the same remedies mentioned in the synochal stage. When these did not afford relief, I applied an epispastic to the region of the stomach; and when this failed, I sometimes excited an inflammation in the salivary glands with success.

2. *Flatulences.* These were best obviated by keeping the bowels open: cathartics of castor oil, and infusions of aniseed commonly answered the desired end, when not rejected by the stomach; but when the stomach rejected things taken by the mouth, recourse was had to enemata and fomentation of the distended parts with brandy, and the infusion of aromatics.

The third or sinking stage being merely an augmentation or diversification of the *second*, required the same remedies, only more assiduously applied. Epispastics, however, were incapable of vesicating the skin, and mercury of inflaming the salivary glands.

Convalescence was, in general, slow, and frequently attended with hectical and anasarcous affections. Bark, bitters, cha-

lybeates and corroborative syrups, with brandy and wine, easily digested aliment, and gentle exercise, were the best means to invigorate the system and accelerate recovery.

ARTICLE III.

Staten-Island, August 8, 1802.

SIR,

Enclosed I have attempted to give you a short description of the quarantine establishment, and a general account of the occurrences at this place in the last season. A particular detail of some of the sickly vessels, it is at present out of my power to furnish you with; but this shall be done as soon as I can procure them.

With the greatest respect,
I am your most obedient humble servant,

Dr. HAMMERSLY. *JOSEPH BAYLEY.*

THE Marine Hospital is very pleasantly situated on rising ground, near the water, within half a mile of the north-eastern extremity of Staten-Island. Thirty acres of ground, including the beach, have been purchased and appropriated to the purpose of erecting thereon all the requisite buildings for the objects of Quarantine. The buildings front the east, are eight miles distant from the city of New-York, and open to the sea breeze, which passes freely through them.

The ground about the establishment, for some distance, is very rough, being principally high uncultivated hills, upon which there is some shrubbery, chiefly cedars. A constant stream of water runs through the Quarantine Ground, which is derived from a number of springs, in a valley, within half a mile of the shore; these uniting their little rills afford a continual stream of water, which is of primary importance to this institution. There are seven separate buildings for the reception of sick; six of one story, and one of two, constructed of wood, well ventilated, being only twenty feet deep, windows opposite to each other, and ventilators at top; they will accommodate 200 patients. There are several other buildings, viz. a house for the Health Officer, another for the Revenue Officer, a boatman's house, gardener's, and wash-house, kitchens, and two very large stores.

Nine hundred and forty-five patients were admitted into the Marine Hospital, from May 1st, to December 1st, 1801. Their

diseases were principally ship and yellow fever, and dysentery; one hundred and eighty-nine of them died. The following are the vessels from which they were chiefly sent.

Vessels names.	From whence.	Arrived.	Disease.	No. of sick.	Died.
Ship Venus,	Newry.	May 7.	Ship fever.	28	
—— Venus,	Dublin.	20.	Do.	27	1
Brig Recovery,	Greenock.	20.	Do.	3	
Ship Phœnix,	Do.	25.	Do.	3	1
—— Penelope,	Newry.	June 10.	Yellow and ship fever, small-pox and dysentery.	262	74
—— Enterprize,	Londonderry.	24.	Ship fever.	12	2
—— Ocean,	Havanna.	July 23.	Yellow fever.	5	2
Brig Flora,	Sligo.	29.	Ship fever.	192	38
—— Rambler,	New-York.	Aug. 12.	Yellow fever.	4	2
Barque Resolution,	Londonderry	Sept. 16.	Ship fever.	43	2
Ship Nancy,	Sligo	28.	Ship fever and dysentery.	228	32

Most of the attendants of the institution were infected three or four times, and some were unable to do any duty for five or six weeks at a time; they generally sickened in a few days after a great number of patients had been suddenly admitted. There not being accommodations for more than fifty patients at the commencement of the season, and the ship Penelope arriving on the 10th of June, with upwards of one hundred and fifty sick on board, at which time there were twenty patients in the hospital, we were painfully necessitated to crowd forty in a ward forty feet by twenty, that could not comfortably contain more than sixteen. Eighty-four sick persons were taken out of this ship two days after her arrival, and crowded in this manner, which certainly comparatively much mended their situations, although we very soon felt the fatal effects of contaminated air; the three days following we pitched a few tents, and received fifty more sick from the ship. The Health Commissioners, immediately on her arrival, applied to the Corporation of the city of New-York, and obtained a grant of fifteen hundred dollars to erect buildings to accommodate them; and in a fortnight three buildings, forty feet by twenty, were put up; so that in the following eight days upwards of one hundred more sick were sent from among her passengers. The sails and spars of the ship were brought on shore, and the well passengers were employed in making shelter for themselves, that by removing them from the source of the disease, the progress of it might be checked. Forty-two of them died the first fortnight after her arrival. By the time the sick were rendered comfortable and the attendants had recovered from their indispositions, the brig Flora arrived, July 29, from Sligo. Sixty-three patients were in the hospital at this time, and in a few days the wards were again crowded with one hundred and ninety-two sick persons from this vessel. The great fatigue of the nurses

on this occasion, and the air of the hospitals becoming again infected, caused many of them to sicken. The next severe trial we underwent was on the arrival of the ship Nancy, from Sligo; and this vessel exceeded all the others in the number of sick on board at her arrival, the filthy state they were in, as well as the ship itself, and the very offensive nature of their complaint, principally dysentery. Fifty-three were in the hospital when she came into this port, and one hundred and forty were received from her the two first days they were permitted to land the sick, and in a few days following ninety-two more, as fast as beds could be got ready for them. Room was not wanted, for a large two-story building, one hundred and twenty feet long, and twenty wide, which had been erected for the reception of the healthy passengers from sickly vessels, we were obliged to use for the sick; and the well were put under tents and temporary sheds. Although the precaution was taken to strip, wash them all over, and put clean linen on them before they were taken into the hospitals to their clean beds; and such as could not be furnished with clean linen, were put to bed naked, and the window shutters (for there are no sashes) were kept so constantly open during the day, that many complained so much of the cold that additional covering was given to them; yet all these measures did not prevent some of the attendants from being infected.

The ship Venus, of New-York, Captain Staunton, sailed from Newry, Ireland, March 13th, 1801, and arrived at the Quarantine anchorage, May 6th, navigated by ten persons, all in health; there were on board seventy cabin and steerage passengers; several were sick during the passage, and one child died; nine persons were ill on her arrival, and nineteen more sickened after they were landed. Their disease was ship fever, which usually on the ninth day was attended with a profuse sweat, which left the patient free from fever, but in a feeble state; the pulse becoming regular, returning appetite and refreshing sleep, all promised a speedy re-establishment of health. These pleasing prospects were of short duration, for twenty-seven of the twenty-eight, from the third to the seventh day after their complaint appeared to terminate so favourably, relapsed, commencing in the same manner as the first attack, with cold chills, sometimes with rigors, succeeded with hot and dry skin, constant thirst, full and frequent pulse. All the above cases terminated in health from the twenty-first to the twenty-third day from the commencement of the disease, by a very profuse sweat.

The prevailing report of the passengers was, that the dis-

case was brought on board by a woman who came from the country, with her husband and child, to take passage for America; being late in the afternoon when they arrived in town, they lodged in a house where a person had died a short time before with a malignant fever, of which several persons had died at that place. This woman was taken ill a few days after the vessel was at sea; her husband and child were the next persons taken sick; (the child died), then those persons who occupied the next birth to them; soon after those who were farthest off, as well as those who were nearest, were indiscriminately seized.

The ship Enterprize, of New-York, Capt. Fortescue Cumming, sailed from Londonderry, May 3d, and arrived here June 21st, 1802, navigated by thirteen persons, all in perfect health. Cargo, a few linens and ballast. Two hundred and ninety-six passengers; all in health since they have been on board; two children died on the passage.

This vessel was permitted to proceed to the city with all her people on board; the commander took every precaution to keep the passengers healthy, by steering in a northern latitude as far as his course would permit, by ordering all their bedding on deck every day the weather would admit, and having the places they occupied washed out and sprinkled with vinegar frequently. Notwithstanding all these precautions, some of the passengers must have been under the influence of confined air when the ship arrived, although I believe unknown to the captain, for, on the 26th June, two young women who came in this vessel were sent by the Resident Physician to the Marine Hospital, both very ill with ship fever, and had been sick three or four days; on the 28th four others were sent, who came in the same ship, with the same disease, and on the 30th six more; of these twelve two died: it was known, at this time, that a number of them were sick in the city. The Hospital, on Staten-Island, and a number of tents were crowded with fever patients. The Health-Officer requested the Health Commissioners to propose to the Corporation to open Bellevue Hospital; but, instead of this they made a second grant of one thousand five hundred dollars, to erect buildings for their accommodation, and arrangements were made for one or two wards, in the New-York Hospital, to receive the emigrants that sickened in the city until these buildings could be put up.

The Barque Resolution, Capt. Geddings, sailed from Londonderry, July 18th, and arrived at Quarantine Sept. 11th. navigated by eleven persons, in health during the voyage. This

vessel had on board 200 passengers; three children died on the passage, and a few persons were sick on her arrival. During her detention 43 persons were sent from her to the hospital with ship fever; two of them died. Cargo, coals and linens.

Ship Nancy, Capt. John Heron, sailed from Sligo, July 12th; arrived at Quarantine Sept. 27; navigated by 9 persons, all unwell; had on board when the vessel left Ireland, 417 passengers; the ship lay there a long time receiving them; of this number 80 died on the passage, and about 150 sick; on her arrival scarce a healthy countenance to be seen on board; cargo, linen. The distress exhibited on board this ship surpassed all I had ever before seen; one half unable to do any thing for themselves, and the other half from their weak state could with difficulty take care of themselves, consequently very little assistance was given to those who were ill: their diseases were ship fever and dysentery, and between the decks, where they lay, was the receptacle of their intestinal evacuations, in such quantity, that it ran out of the scuppers, soiled the sides of the vessel and the rigging to such extent that the Health Officer could not get on board; the upper deck was over shoes in filth, and the people themselves as unsightly in clothing and person as dirt could make them: two men expired as soon as they were landed.

This ship was chartered by a commercial house in Sligo, for the express purpose of bringing people to America, if they could live through the famine and pestilence that awaited them. That more persons might he stowed away than the accommodation of the ship would allow of, temporary births were fitted on deck, in which about 100 of these distressed emigrants were destined to be eleven weeks; six feet in length by five in breadth, just high enough to sit up in, and a door to creep in at, was allotted for four persons each. Their provisions of beef, pork, and fish were of the worst sort; the water was put in casks that had been used for salted meat, and was so offensive and bad that it could, for the latter part of the passage, be used only in gruel.

ARTICLE IV.

FACTS *intended to prove the* YELLOW FEVER *not to be contagious, and instances of its supposed Contagion explained upon other principles. By* BENJAMIN RUSH, *M. D. Professor of Medicine in the University of Pennsylvania; in a Letter to Dr.* EDWARD MILLER.

DEAR SIR,

WHEN fevers are communicated from one person to another, it is always in one of the following ways: 1st. By secreted matters. 2dly. By excreted matters. The small-pox and measles are communicated in the former way; the jail, or, as it is sometimes called, the ship and hospital fever, is communicated only by means of the excretions of the body. The perspiration, by acquiring a morbid and irritating quality, more readily than any other excretion, in consequence of its stagnation and confinement to the body in a tedious jail fever, is the principal means of its propagation. The perspiration* is, moreover, predisposed to acquire this morbid and acrid quality, by the filthiness, scanty or bad aliment, and depression of mind, which generally precede that fever. It is confined to sailors and passengers in foul and crowded ships, to prisoners and patients in foul and crowded jails and hospitals, and to poor people who live in small, damp, and confined houses. It prevails chiefly in cool and cold weather, but is never epidemic; for the excreted matters which produce the fever do not float in the external atmosphere, nor are they communicated so as to produce disease, more than a few feet from the persons who exhale them. They are sometimes communicated by means of the clothes which have been worn by the sick, and there have been instances in which the fever has been produced by persons who had not been confined by it, but who had previously been exposed to all the causes which generate it. It has been but little known in the United States since the revolutionary war, at which time it prevailed with great mortality in the hospitals and camps of the American army. It has now and then appeared in ships that were crowded with passengers from

* The deleterious nature of this fluid, and its disposition to create disease, under the above circumstances, has been happily illustrated by Dr. Mitchill, in an ingenious Letter to Dr. Duncan, of Edinburgh, published in the 4th volume of the Annals of Medicine.

different parts of Europe. It is a common disease in the manufacturing towns of Great-Britain, where it has been the subject of several valuable publications, particularly by Dr. Smith, and Dr. John Hunter. Dr. Haygarth has likewise written upon it, but he has unfortunately confounded it with the West-India and American yellow fever, which differs from it, in prevailing chiefly in warm climates and seasons; in being the offspring of dead and putrid vegetable and animal matters; in affecting chiefly young and robust habits; in being generally accompanied with a diseased state of the stomach, and an obstruction or preternatural secretion and excretion of bile; in terminating most commonly within seven days; in becoming epidemic *only* by means of an impure atmosphere, and in not furnishing ordinarily those excretions which when received into other bodies, reproduce the same disease.

That the yellow fever is not contagious in its simple state, and that it spreads exclusively by means of exhalations from putrid matters, which are diffused in the air, is evident from the following considerations:

1. It does not spread by contagion in the West-Indies. This has been proved in the most satisfactory manner by Doctors Hillary, Huck, Hunter, Hector M'Lean, Clark, Jackson, Borland, Pinkard, and Scott. Dr. Chisholm stands alone, among modern physicians, in maintaining a contrary opinion. It would be easy to prove, from many passages in the late edition of the Doctor's learned and instructive volumes, that he has been mistaken; and that the disease was an endemic of every island in which he supposed it to be derived from contagion. Of this, the fullest evidence will shortly be laid before the public by Dr. Caldwell.

2. The yellow fever does not spread in the country when carried thither from the cities of the United States.

3. It does not spread in yellow fever hospitals, when they are situated beyond the influence of the impure air in which it is generated.

4. It does not spread in cities (as will appear hereafter) from any specific matters emitted from the bodies of sick people.

5. It generally requires the co-operation of an *exciting* cause, with miasmata, to produce it. This is never the case with diseases which are universally acknowledged to be contagious.

To the first four of these assertions there are some seeming exceptions in favour of the propagation of this fever by contagion. I shall briefly mention them, and endeavour to explain them upon other principles.

The circumstances which seem to favour the communication of the yellow fever from one person to another, by means of what has been supposed to be contagion, are as follow:

1. A patient being attended in a small, filthy, and *close* room. The excretions of the body, when thus accumulated, undergo an additional putrefactive process, and acquire the same properties as those putrid animal matters which are known to produce malignant fevers. I have heard of two or three instances in which the yellow fever was propagated by these means in the country, remote from the place where it originated, as well as from every external source of putrid exhalation. The plague is sometimes propagated in this way in the low and filthy huts which compose the alleys and narrow streets of Cairo, Smyrna, and Constantinople.

2. A person sleeping in the sheets, or upon a bed impregnated with the sweats or other excretions, or being exposed to the smell of the foul linen, or other cloathing of persons who had the yellow fever. The disease here, as in the former case, is communicated in the same way as from any other putrid animal matters. It was once received in Philadelphia from the effluvia of a chest of unwashed clothes, which had belonged to one of our citizens who had died with it in Barbadoes; but it extended no further in a large family than to the person who opened the chest. I have heard of but two instances more of its having been propagated by these means in the United States, in which case the disease perished with the unfortunate subject of it; for the superstitious dread of contagion has generally produced, not only great care in washing sheets and clothes, and airing beds supposed to be infected, but frequently the total destruction of them by fire and water.

I am disposed to believe the linen, or any other cloathing of a person in good health that had been strongly impregnated with sweats, and afterwards suffered to putrefy in a confined place, would produce the same disease as in the cases above-mentioned.* The changes which the healthy excretions by the pores undergo by putrefaction, may easily be conceived, by recollecting the offensive smell which a pocket handkerchief acquires that has been used for two or three days to wipe away the sweat of the face and hands in warm weather.

3. The protraction of a yellow fever to such a period as to dispose it to assume the symptoms, and to generate the peculiar and highly volatilized exhalation from the pores of the

* See Van Swieten on Epidemic Diseases, Aphorism 1408.

skin, which takes place in the jail fever. I am happy in finding I am not the author of this opinion. Sir John Pringle, Dr. Monro, and Dr. Hillary, speak of a contagious fever produced by the combined action of marsh and human miasmata. The first of those physicians supposes the Hungarian bilious fever which prevailed over the continent of Europe in the seventeenth century, was sometimes propagated in this way, as well as by marsh and other putrid exhalations. Dr. Richard Pearson, in his observations upon the bilious fevers which prevailed in the neighbourhood of Birmingham, in England, in the years 1797, 1798 and 1799, has the following remark: "In its first stage, this fever did not appear to be contagious, but it evidently was so after the eleventh and fourteenth day, when the *typhoid* state was induced."* As this protracted state of bilious fever rarely occurs in our country, it has seldom been communicated in this way.

It is not peculiar, I believe, to a bilious and yellow fever, when much protracted beyond its ordinary duration, to put on the symptoms of the jail fever. The same appearances occur in the pleurisy, and in other, of what Dr. Sydenham calls *intercurrent* fevers, all of which I have no doubt, under certain circumstances of filth and confinement, would produce a fever in persons who were exposed to it. This fever, if the weather were cold, would probably put on inflammatory symptoms, and be added, in our nosologies, to the class of contagious diseases.

4. Miasmata, whether from marshes, or other external sources, acting upon a system previously impregnated with the excreted matters which produce the jail or ship fever. Mr. Lempriere informs us, that he saw what were supposed to be cases of yellow fever communicated by some sailors who brought the seeds of the ship fever with them to the island of Jamaica. The fevers which affected most of the crews of the Hussar frigate, mentioned by Dr. Trotter,† and of the Busbridge Indiaman, described by Mr. Bryce,‡ appear to have been the effect of the combined operation of foul air in those ships, and human excretions upon their systems. The disease was barely tinged with bilious symptoms, and hence the facility with which it was cured, for the jail fever more readily yields to medicine than the yellow fever. The former was probably excited by some latent exhalation from dead matters in the

* Page 13.
† Medicina Nautica, p. 360.
‡ Annals of Medicine, vol. i. p. 116.

holds of the ships, and hence we find it ceased on shore, where it was deprived of its exciting cause. It is true, great pains were taken to clean the hold and decks of the Busbridge, but there are foul matters which adhere to the timbers of ships, and which, according to Dr. Lind, are sometimes generated by those timbers when new, that are not to be destroyed by any of the common means employed for that purpose. Of this Dr. Kollock has furnished us with a most satisfactory proof in his history of the yellow fever, which prevailed on board of the frigate General Greene, on her voyage to the Havanna, in the year 1799. "The air in the hold of the vessel (says the Doctor) was so contaminated, as to extinguish lights immediately, and candles in the cockpit were almost as useless from the same cause. The fish were thrown overboard, and the decks washed and scoured, the ventilator and wind sails put in motion, and every measure of purification adopted that their situation allowed; notwithstanding these precautions, disease invaded us. The men were unceasing in their exertions to purify the ship; washing, scouring with vinegar, burning powder and vinegar, old junk, and sulphur, added to constant ventilation, proved unequal even to the amelioration of their calamities, while they were in the latitude of *great heat.* After the removal of the sick, the ship was disburthened of her stores, ballast, &c. cleansed and white-washed throughout; still new cases occurred for nearly two months. Some days, two, three or four, were sent off to the hospital, which would seem to indicate the retention of some portion of this noxious principle, which was lodged beyond the reach of the cleansing process." That this noxious principle or matter existed in the ship, and not in the bodies of the crew, is evident, from its not having been communicated in a single instance by a hundred of them who were sent to a hospital on Rhode-Island, notwithstanding an intercourse sufficient to propagate it was necessarily kept up with the inhabitants. Even their nurses did not take it.*

A fifth instance in which contagion has been supposed to take place in the yellow fever is, where the exhalation from the excretions of a patient in that disease acts as an *exciting* cause, in persons previously impregnated with the marsh, or other external miasmata, which produce it. The activity of this exhalation, even when it is attended with no smell, is so great, as to induce sickness, head-ache, vertigo and fainting. It is not peculiar to the exhalations from such patients to produce mor-

* Medical Repository, vol. iv. No. 1.

bid effects upon persons who visit them. The odour emitted by persons in the confluent small-pox has been known to produce the same symptoms, together with a subsequent fever and apthous sore-throat. This has been remarked long ago by Dr. Lind, and latterly by Dr. Willan, in his reports of the diseases of London.* That the yellow fever is often excited in this way, without the intervention of a supposed specific contagion, I infer from its sometimes spreading through whole families, who have breathed the same impure atmosphere with the person first affected by the fever. This is more especially the case where the impression made by the exhalation from the sick person is assisted by fear, fatigue, or anxiety of mind in other branches of the family. In favour of this mode of exciting the yellow fever, Dr. Otto communicated to me the following fact. In the autumn of the year 1798, it prevailed upon the *shores* of the Delaware, in Gloucester county, in New-Jersey. A mild remittent prevailed at the same time on the *high* grounds, a few miles from the river. During this time, the Doctor observed, if a person who had taken the yellow fever in Philadelphia afterwards came into a family *near* the river, the same disease appeared in several instances in one or more branches of that family; but where persons brought the fever from the city, and went into a family on the *high* grounds, where the mild remittents prevailed, there was not a single instance of a yellow fever being excited by them in any of its members. This fact is important, and of extensive application. It places the stimulus from the exhalations of persons affected by the yellow fever upon a footing with intemperance, fatigue, heat, and all the common exciting causes of the disease; none of which it is well known can produce it, except in persons who have previously inhaled the putrid miasmata, which in all countries are its only remote cause. The city of Philadelphia has furnished in all our yellow fever years many additional proofs of the correctness of Dr. Otto's remark. In the months of July and August, when miasmata are generally local, and float chiefly near to their hot beds, the docks and holds of ships, persons who are affected by these miasmata, and sicken in other parts of the city, never communicate the disease; but after the less prepared and heterogeneous filth of our whole city has been acted on by an autumnal, as well as summer sun, so as to emit pestilential exhalations into all our streets and alleys, the fever is now and then excited in

* Page 13 and 113.

the manner that has been mentioned, by a single person in a whole family. The common intermittents of the southern states are often excited in the same way, without being suspected of spreading by contagion. Even the jail or hospital fever is vindicated by Dr. Hunter, from the highly contagious nature which has been ascribed to it upon the same principle. His words, which are directly to my purpose, are as follow: "In considering the extent and power of the contagion (meaning of the jail or hospital fever), I am not inclined to impute to this cause the fevers of all those who are taken ill in one family after the first, as they are all along exposed to the same vitiated air which occasions the first fever. In like manner, when a poor woman visits some of her sick neighbours, and is taken ill herself, and afterwards some of her children, I would not impute the disease to infection alone; she and her family having previously lived in the same kind of vitiated air which originally produced the fever. If the cases in which the infection meets with the poison already *half-formed* be excepted, the disease in itself will be found to be much less infectious than has been commonly supposed."* By the modes of communicating the yellow fever which have been admitted, the dysentery, and all the milder forms of autumnal fevers, have been occasionally propagated, and perhaps oftener than the first named disease, from their being more apt to run on to the typhus or chronic state. Of this I could adduce many proofs, not only from books, but from my own observations; but none of these diseases spread by contagion, or become epidemic from that cause in any country. A contrary opinion, I know, is held by Dr. Cleghorn, and Dr. Clarke; but they have deceived themselves, as they formerly deceived me, by not attending to the difference between secreted contagions and morbid excretions from the body, produced by the causes which have been enumerated, and which are rare and accidental concomitants of bilious or summer diseases.

6. The last instance of supposed contagion of the yellow fever, is said to arise from the effluvia of a putrid body that has died of that disease. The effluvia in this case act either as the putrefied excretions mentioned under the first head, or as an exciting cause upon miasmata, previously received into the system. A dead body, in a state of putrefaction from any other disease, would produce, under the same circumstances of season and predisposition, the same kind and degrees of fever.

* Medical Transactions, vol. iii. p. 351.

From the explanation that has been given of the instances of supposed contagion of the yellow fever, we are compelled to resort to certain noxious qualities in the atmosphere, as the exclusive causes of the prevalence, not only of that fever, but (with a few exceptions) of all other epidemic diseases. It is true, we are as yet ignorant of the precise nature of those qualities in the air which produce epidemics; but their effects are as certainly felt by the human body as the effects of heat, and yet who knows the nature of that great and universal principle of activity in our globe?

That the yellow fever is propagated by means of an impure atmosphere at all times, and in all places, I infer from the following facts.

1. It appears only in those climates and seasons of the year in which heat, acting upon moist animal and vegetable matters, fills the air with their putrid exhalations.

2. It is unknown in places where a connection is not perceptible between it, and marshes, mill-ponds, docks, gutters, sinks, unventilated ships, and other sources of noxious air. The truth of this remark is established by many facts in Mr. Lempriere's excellent history of the diseases of Jamaica, and by most of the writers upon tropical diseases. There is likewise no exception to it in the United States.

3. It is destroyed, like its fraternal diseases, the common bilious and intermitting fevers, by means of *long-continued* and *heavy* rains.* When rains are heavy, but of short duration, they suspend it only in warm weather; but when they are succeeded by cold weather, they destroy all the forms of bilious fever. The malignant tertians described by Dr. Cleghorn, always ceased about the autumnal equinox; for at that time, says the Doctor, "Rain falls in such torrents as to tear up trees by the roots, carry away cattle, break down fences, and do considerable mischief to the gardens and vineyards; but after a long and scorching summer they are very acceptable and beneficial, for they mitigate the excessive heat of the air, and give a check to epidemical diseases.†

4. It is completely destroyed by frost. Now as neither rains nor frosts act in sick rooms, nor affect the bodies of sick people, they must annihilate the disease by acting exclusively upon the atmosphere. Very different in their nature are the small-pox and measles, which are propagated by specific contagion. They

* Clarke on the Diseases of long Voyages to hot Climates, p. 116.
† Diseases of Minorca, p. 8.

do not wait for the suns of July or August, nor do they require an impure atmosphere, or an exciting cause, to give them activity. They spread in the winter and spring as well as in the summer and autumnal months; wet and dry weather do not arrest their progress, and frost (so fatal to the yellow fever), by rendering it necessary to exclude cold air from sick rooms, increases the force of their contagion, and thereby propagates them more certainly through a country.

It has often been asked, why do not the putrid matters which produce yellow fever in some years, produce it every year? This question might be answered by asking several others. Why does not the matter which produces the malignant sore throat (which is certainly a domestic disease), produce it every year? Why does the dysentery rise up in our own country, and spread sickness and death through whole families and villages in one year, and disappear from the same places for fifteen or twenty years afterwards? All these questions may be answered by resolving the cause into a concurrence of what has been called an inflammatory or malignant constitution of the atmosphere, the effects of which are no less obvious upon the small-pox and measles than they are upon the former diseases which have been mentioned.

This malignant state of the air has been noticed by all writers upon epidemics, in all the nations of Europe, from Hippocrates down to the present day. An acknowledgment of its influence has lately been made on this side the Atlantic, by Dr. Baltazar de Villalobos, in a history of a pestilential fever which lately prevailed in Chancay, in South-America, a copy of which was put into my hands last summer by Dr. Seip, soon after his return from Lima.* I am sorry to add, the existence of this το Θειον of the father of physic was denied for the first time in the United States. It is to no purpose to say its presence has not been detected by any chemical agents. The same thing has been justly said of the exhalations which produce the bilious intermitting, remitting and yellow fever. No experiment that has yet been made has discovered their presence in the air. The eudiometer has been used in vain for this purpose. In one experiment made by Dr. Gattani, the air from a marsh at the mouth of the river Vateline was found to be apparently purer by two degrees than the air on a neighbouring mountain, which was two thousand eight hundred and eighty feet higher

* Y descripcion de la feibre Epidemica que por los Anos de 1796 y 1797, affligio varis poblaciones del partido de Chancay, p. 32, 33.

than the sea. The inhabitants of the mountain were notwithstanding healthy, while those who lived in the neighbourhood of the marsh were annually afflicted with bilious and intermitting fevers.* The contagions of the small-pox and measles consist of matter, and yet who has ever discovered this matter in the air? We infer the existence of those remote causes of diseases in the atmosphere only from their effects. Of the existence of putrid exhalations in it there are other evidences besides bilious and yellow fevers. They are sometimes the objects of the sense of smelling. We see them in the pale or sallow complexions of the inhabitants of the countries which generate them, and we observe them occasionally in the diseases of several domestic animals.

The advocates for the yellow fever being a specific disease, and propagated only by contagion, will gain nothing by our admitting an inflammatory constitution of the atmosphere (the cause of which is unknown to us), to be necessary to raise common remittents to that grade in which they become malignant yellow fevers. They are obliged to have recourse to an unknown quality in the air every time they are called upon to account for the disease prevailing chiefly in our cities, and not spreading when it is carried from them into the country. The same reference to an occult quality in the air is had by all the writers upon the plague, in accounting for its immediate and total extinction when it is carried into a foreign port.

In speaking of the influence of an inflammatory constitution of the atmosphere in raising common bilious to malignant yellow fevers, I wish not to have it supposed that its concurrence is necessary to produce sporadic cases of that or any other malignant disease. Strong exciting causes, combined with highly volatilized and active miasmata, I believe, will produce a yellow fever at any time. I have seen one or more such cases almost every year since I settled in Philadelphia, and particularly when my business was confined chiefly to that class of people who live near the wharves, and in the suburbs, and who are still the first, and frequently the only victims of the yellow fever.

From the account that has been given of the different ways in which this disease is communicated from one person to another, and from the facts which establish its propagation exclusively through the medium of the atmosphere, when it be-

* Alibert's Dissertation sur les Fievres pernicieuses at Attaxiques Intermittentes, p. 185.

comes epidemic, we may explain several things which belong to its history, that are inexplicable upon the principle of its specific contagion.

1. We learn the reason why, in some instances, the fever does not spread from a person who sickens or dies at sea, who had carried the seeds of it in his body from a sickly shore. It is because no febrile miasmata exist in the bodies of the rest of the crew to be excited into action by any peculiar smell from the disease, or by fear or fatigue, and because no morbid excretions are generated by the person who dies. The fever which prevailed on board the Nottingham East-Indiaman, in the year 1766, affected those forty men only who had slept on shore on the island of Joanna twenty days before. Had the whole crew been on shore, the disease would probably have affected them all, and been ascribed to contagion generated by the first persons who were confined by it.* A Danish ship, in the year 1768, sent twelve of her crew on shore for water. They were all seized after their return to the ship with a malignant fever, and died without infecting any person on board, and from the same causes which preserved the crew of the Nottingham Indiaman.†

2. We learn the reason why the disease sometimes spreads through a whole ship's crew apparently from one or more affected persons. It is either because they have been confined to small and close births by bad weather, or because the fever has been protracted to a typhus or chronic state, or because the bodies of the whole crew are impregnated with morbid miasmata, and thus predisposed to have the disease excited in the manner that has been mentioned. In the last way it was excited in most of the crew of the United States frigate in the Delaware, opposite to the city of Philadelphia, in the year 1797. It appears to have spread from a similar cause, from a few sailors, on board the Grenville Indiaman, after touching at Batavia. The whole crew had been predisposed to the disease by inhaling the noxious air of that island.

The same reasons account for the fever expiring in a healthy village or country; also for its spreading, when carried to those towns which are seated upon creeks or rivers, and in the neighbourhood of marsh exhalations. It has uniformly perished in the high and healthy village of Germantown, when carried from Philadelphia, and has three times appeared to be con-

* Observations on the Bilious Fevers usual in voyages to the East-Indies, by James Badinach, M. D. Medical Observations and Inquiries, vol. iv.

† Clarke on the Diseases of long Voyages to hot Climates, p. 123, 125.

tagious near the muddy shores of the creeks which flow through Wilmington and Chester.

3. From the facts that have been mentioned, we are taught to disbelieve the possibility of the disease being imported in the masts and sails of a ship, by a contagious matter secreted by a sailor who may have sickened or died on board her on a passage from a West-India island. The death in most of the cases of contagion, supposed to be imported in this way, occurs within a few days after the ship leaves her West-India port, or within a few days after her arrival. In the former case, the disease is derived from West-India miasmata; in the latter, it is derived either from the foul air of the hold of the ship, or of the dock or wharf to which the ship is moored.

It is a good practice to measure the truth or error of opinions in science by the influence they are calculated to produce upon national, physical, and moral happiness.

A belief in the non-contagion of the yellow fever, and of its being incommunicable except in one of the five ways that have been mentioned, is calculated to produce the following good effects:

1. It will deliver the States which have sea-ports, from four-fifths of the expenses of their present quarantine laws and lazarettoes. A very small apparatus in laws and officers would be sufficient to prevent the landing of persons affected by the ship fever in our cities, and the more dangerous practice of ships pouring streams of pestilential air, from their holds, upon the citizens who live near our docks and wharves.

2. It will deliver our merchants from the losses incurred by the delays of their ships by long and unnecessary quarantines. It will, moreover, tend to procure the immediate admission of our ships into foreign ports, by removing that belief in the contagious nature of the yellow fever which originated in our country, and which has been spread by the public acts of our Legislatures and Boards of Health throughout the globe.

3. It will deliver our citizens from the danger to which they are exposed by spending the time of the quarantine on board of vessels in the neighbourhood of the marshes, which form the shores of the rivers or coasts of quarantine roads. This danger is much increased by idleness, and by the vexation which is excited by sailors and passengers being detained unnecessarily fifteen or twenty days from their business and friends.

4. It will lead us to a speedy removal of all the excretions, and a constant ventilation of the rooms of patients in the yellow

fever, and thereby to prevent the accumulation and further putrefaction of those exhalations which may reproduce it.

5. It is calculated to prevent the desertion of persons in the yellow fever by their friends and families, and to produce caution in them to prevent the excitement of the disease in their own bodies, by means of low diet and gentle physic, proportioned to the impurity of the air, and to the anxiety and fatigue to which they are exposed in attending the sick.

6. It will put an end to the cruel practice of quieting the groundless fears of a whole neighbourhood, by removing the poor who are affected by the fever from their houses, and conveying them, half dead with disease and terror, to a solitary or crowded hospital.

7. By deriving the fever from our own climate and atmosphere, we shall be able to foresee its approach in the increased violence of common diseases, in the morbid state of vegetation, in the course of the winds, in the diseases of certain brute animals, and in the increase of common, or the appearance of uncommon insects.

8. A belief in the non-contagion of the yellow fever, and its general prevalence from putrid animal and vegetable matters *only*, is calculated to lead us to drain or cover marshy grounds, and to remove from our cities all the sources of impure air, whether they exist in holds of ships, in docks, gutters, and common sewers, or in privies, gardens, yards and cellars, more especially during the existence of the signs of a malignant constitution of the air mentioned under the preceding head. By these means I believe (the assertion is not too bold a one) the yellow fever might be as effectually annihilated as the small-pox will probably soon be by vaccination. A fever, the same in its causes and similar to it in many of its symptoms, that is, the plague, has been extirpated by extraordinary degrees of cleanliness, from the cities of Holland, Great-Britain, and several other parts of Europe.

You will perceive from the facts and reasonings contained in this letter, that I have relinquished the opinion published in my account of the yellow fever in the years 1793, 1794 and 1797, respecting its contagious nature. I was misled by Dr. Lining, and several West-India writers, in ascribing a much greater extent to the excreted matters in producing the disease than I have since discovered to be correct. You will perceive, likewise, that I have changed my opinion respecting the manner in which the plague is propagated. I once believed, upon the authorities of travellers, physicians, and schools of medi-

cine, that it was a highly contagious disease, generated chiefly by miasmata from living but diseased bodies. I am now satisfied this is not the case. It is the offspring, like the yellow fever, of exhalations from putrid vegetable and animal matters; but from the greater number of people who are depressed and debilitated by poverty and famine, and who live in small and filthy huts* in the cities of the Ottoman Empire, than in the cities of the United States, I believe it to be more frequently communicated from an intercourse with sick people by the morbid excretions of the body, than the yellow fever is in our country. For my change of opinion, upon this subject, I am indebted to Dr. Caldwell's and Mr. Webster's publications upon Pestilential Diseases, and to the travels of Mariti and Sonnini into Syria and Egypt. I reject, of course, with the contagious quality of the plague, the idea of its ever being imported into any country so as to become epidemic, by means of a knife case, a piece of cotton, or a bale of silks, with the same decision that I do all the improbable and contradictory reports of an epidemic yellow fever being imported in a sailor's jacket, or in the timbers and sails of a ship that had been washed by the salt water, and fanned by the pure air of the ocean, for several weeks on her passage from the West-Indies to the United States.

It gives me pleasure to find this unpopular opinion of the non-contagion of the plague is not a new one. It was held by the Faculty of Medicine, in Paris, in the beginning of the eighteenth century, and it has since been defended by Dr. Stoll, of Vienna, Dr. Samoilowitz, of Russia, and several other eminent physicians. Dr. Heberden, jun. has lately called in question the truth of all the stories that are upon record of the plague having been imported into England in the last century; and the researches of the physicians who accompanied the French army into Egypt, it is said, have produced the most satisfactory proofs of its not being contagious in its native country.

I am aware of the influence which such changes in medical opinions as I have acknowledged have upon a physician's reputation; but small, indeed, should I consider the total sacrifice of mine, could it avert the evils which are connected with a belief in the importation of pestilential diseases, and insure the benefits to the world which would necessarily flow from the

* M. Savary, in his travels, says, two hundred persons live in Cairo within a compass that accommodates but thirty persons in Paris.

establishment of the principles contained in this letter. I expect but little success from it. My principal design in writing it is to deduct that portion from the misery produced by plagues and yellow fevers, which my former opinion of the manner in which they are propagated may possibly have created. Even this consolation, I fear, will be denied to me in Philadelphia; for, with as little reason as formerly in favour of imported contagion, the majority of our citizens who believe in it, is greater and more decided than in former years. Never has the unity of our autumnal fever been more clearly demonstrated than in our present epidemic. Its four principal grades, viz. The intermittent, the mild remittent, the inflammatory bilious fever, and the malignant yellow fever, have all run into each other in many instances. A tertian has ended in death with a black vomiting; and a fever, with the face and eyes suffused with blood, has ended in a quotidian, which has yielded to a few doses of the bark. The fever in Baltimore, I have been informed, has put on exactly the same multiform appearances and changes. But in vain have these facts, and many others equally striking, been urged in favour of the domestic origin of our present fever. Our citizens indolently repose in a belief that it was derived from a vessel, on board of which two persons died on her passage from St. Domingo. This execrated, but harmless vessel, was thoroughly cleansed at the Lazaretto, where she lay twenty days, and no person who worked on board of her has died, or been indisposed since her arrival. It is probable several cases of fever may have originated from the foul air of some other vessels, but the greatest part of them have been evidently derived from putrid exhalations from our docks, wharves, yards and cellars in different parts of the city. Not an instance has been seen of the disease spreading by contagion. Where more than one in a family have been affected, it was obviously derived from the same putrid source. Some of our citizens admit the possibility of the disease originating from the noxious air of a ship, but do not see the sameness in the nature of foul air, whether it be generated in the hold of a ship, or by putrid matters on shore. They moreover confound this air with a supposed specific contagion generated in the body of a patient in the yellow fever. I have deplored the continuance of all these errors, so fatal to the lives, and injurious to the property of our citizens, but I have deplored them in silence. By ceasing to oppose them, I have hoped a calm and unprejudiced examination of facts would take place. This is all that is necessary to produce a conviction, that the yellow fever is not

derived from specific contagion; that it is always generated by putrefaction; that it is not contagious, in its simple state, and that it never *was*, *is not*, and (while the laws of nature retain their present order), *never can be* imported so as to become an epidemic in any country.

From your sincere friend,
BENJAMIN RUSH.

Philadelphia, October 8, 1802.

ARTICLE V.

An INQUIRY *into the* UTILITY *of occasional* BLOOD-LETTING *in the* PREGNANT STATE *of* DISEASE: *Communicated in a Letter from Dr.* JOHN VAUGHAN, *of Wilmington (Delaware), to Dr.* MILLER.

[Continued from p. 37, and concluded.]

IT is somewhat remarkable that the objections to blood-letting, in this diseased state, are predicated on the supposition of general debility being induced by the support and growth of the fœtus; when, in fact, several pounds of blood, ordinarily evacuated from the system, are retained for ten lunar months, and deposited in the uterus. If the human fœtus were, on its first evolution, extruded from the mother, and nourished by an evacuation from her system, these objections would be entitled to weight; but when the reverse is the fact, they, of course, are invalid. The only human condition to which these arguments are applicable is that of suckling. In the latter case the child is supported by a drain from the mother's system, and she frequently becomes enfeebled, though the catamenia be retained, to provide for the nutrition of the new-born child. And when mothers continue nurses beyond the period designed by nature, they generally receive a friendly admonition, by an *effort*, or actual return of the constitutional evacuation, to resign the pleasurable office of suckling.

Mr. White, in his "Treatise on the Management of Pregnant and Lying-in Women," &c. declaims warmly against the practice of blood-letting in pregnancy, and adduces the authority of the Father of Medicine, Hippocrates, and others, in support of his doctrine; but, it is to be hoped, an obsequious regard to ancient authorities will not direct the conduct of physicians in the nineteenth century. It is high time for practitioners in medicine to acquire an independency of opinion, and to exercise their own judgment on existing facts.

Mr. White tells us, "It is not probable that the catamenia are caused by a general plethora; but even if this were allowed, it would not from thence follow, that it is the certain attendant of the pregnant state: for if we consider the large quantity of blood which must necessarily *go towards the support of the child*, and the nausea, vomiting, and almost total loss of appetite, which are the frequent concomitants of pregnancy in its early state, it will appear, that if a plethora did at the very first exist, it must, in many constitutions, have a very short duration. I have known several ladies of delicate, tender, weak constitutions, with bad appetites, who never went their full times when they were bled during pregnancy, and as constantly became the mothers of healthy children when that operation was omitted; so that the maxim of Hippocrates, that venesection in *a pregnant woman will produce a miscarriage, especially if she be far gone*, although by much too general, appears not so ill founded as has been lately supposed; especially if we consider the relaxed constitutions in the warm climate where he lived.

"Dr. Lobb, in treating of the *danger of abortion*, has some useful and ingenious observations on this subject. He computes the monthly discharge of women at *five*, *six* or *seven* ounces at a medium. Supposing it seven, the total quantity in ten lunar months amounts to *seventy ounces*, or *four pounds six ounces*. But the weight of a child, with its placenta or membranes, is greatly superior to this; for, in an instance which he adduces, that of the child was *sixteen pounds seven ounces*, and that of the placenta *one pound four ounces*. As all this quantity of matter must first have existed in the mother's arterial system, he concludes that, during pregnancy, there must be a continual diminution of the quantity of blood; and, instead of danger from a plethora, that a woman will never be in so much want of blood in any period of her life. This appears, also, from the thinness of the face and *body* during that period. Hence he infers the danger from bleeding of causing an abortion, by diminishing the vital strength of the mother, and depriving the child of its due nourishment. He observes, *from fact*, that young women who have their full quantity of blood, *their flesh firm*, their bodies strong and agile, and inured to exercise, scarcely ever suffer abortion, except from some violent occasion; whereas, they are most subject to miscarry who are of a tender constitution, have lax muscles, a feeble pulse, and too little blood."

After giving Mr. White's opinions, with his authorities, in his own language, I shall reply to them in detailed order.

1. It is immaterial to the present question, whether the catamenia be occasioned by a general plethora or not. If a given quantity of the sanguiferous fluid be ordinarily discharged by essential laws, and retained in the pregnant state, the consequences are the same. It, however, is essential to the present controversy, to determine the nature of plethora, that the mere sound of terms may not mislead us. We shall therefore define *plethora* to consist in an inordinate quantity of blood, or in the quantity being excessive in proportion to the tone of the solids, whether from a preternatural quantity of the former, or defective state of the latter.

The ingenious and established doctrines of Dr. Rush, in defence of blood-letting in asthenic plethora, or oppressed states of action from a relaxed condition of the system, preclude the necessity of minute discussion on this subject. The immediate effects of bleeding, in relieving the distressed symptoms of ascites and hydrothorax—in equilibriating the circulation and favouring the action of stimulants in various states of debility—in releasing the brain from the depressing effects of concussion or suffusion—and in the restoration of the pulse, from being slow, depressed and labouring—conspire to establish the utility of a careful employment of the lancet, in the irritable stages of pregnancy.

2. The support of the fœtus.—The "quantity of blood which must necessarily go towards the support of the child," should be considered as so much retained from customary evacuations, and determined to the uterus, promoting morbid excitement in that viscus.

When women are constitutionally subject to a discharge of *seventy ounces*, or, agreeably to Blumenbach's computation, of from *five* to *ten pounds* of blood, in ten lunar months, it is unreasonable to suppose, that the retention and accumulation of this quantity of matter* within the system should not produce oppression and congestion in those parts contiguous to the uterus.

The pressure of the gravid uterus on the parietes of the abdomen, in destroying the texture of the integuments, and furrowing the cellular membrane during life, are such evidences of mechanical distention, that we cannot suppose the abdominal viscera to be slightly burthened by impregnation.

* The weight of a full grown fœtus, and its appendages, so far exceeds the ordinary sum of the catamenia in ten lunar months, that other excretions must be lessened in a considerable degree. Sanctorius tells us, that five-eighths of the aliment taken into the system pass off by insensible perspiration.

3. "That a woman will never be in so much want of blood, in any period of her life," as during pregnancy, is really paradoxical. It reminds me of Dr. Garth's allegory of dropsy—

> "Like a miser, in excess she's poor,
> And pines for thirst amidst her watery store."

4. "That venesection in a pregnant woman will produce a miscarriage, especially if she be far gone," is certainly inconsistent with modern experience, and equally repugnant to sound reasoning. In the latter months of pregnancy women are incapacitated for exercise—the appetite is usually good, and the several excretions lessened. Dr. Alexander Hamilton, of Edinburgh, whose authority in midwifery is inferior to none, thinks it at least probable that a larger proportion of blood than usual is prepared from the same quantity of food during the latter months; and when we take into consideration the heterogeneous nature of the circulating blood, and the numerous excretions which are lessened by want of exercise, while the accumulating aid of indulgence in eating and drinking is superadded to them, and also the pressure of the distended uterus contracting the volume of the blood-vessels in the adjacent viscera, I must still contend for this being the plethoric stage of pregnancy.

Mr. White's declaration, that he has known several ladies, of delicate, tender, weak constitutions, with bad appetites, who never went to their full times when they were bled during pregnancy, and as constantly became the mothers of healthy children when that operation was omitted, is only to be opposed by the warranted avowal of different experience, which I make with equal confidence and sincerity. And I am constrained to believe, that the evils resulting from this "*operation*" may justly be imputed to its abuse in point of time or quantity. I have known the loss of a pint of blood, in a delicate pregnant woman, induce premature labour, when from four to eight ounces would have had a different effect.

Some women, who have received benefit from blood-letting in previous pregnancies, or whose feelings dictate its present use, will, to avoid the delicate task of conversing with a physician, employ some mechanical operator, and enjoin him to take a large quantity at once, that it may not require repetition. The consequences are often such as every reflecting physician would anticipate.

The frequent occurrence of convulsions in the last month of gestation, and the relief afforded by bleeding, is counter testi-

mony to the experience of these gentlemen. In a case of autumnal fever, in 1801, in a lady of a florid complexion, but effeminate habit, with tolerably tranquil pulse, I deferred bleeding at the request of her friends, and in the after-part of the same day she was attacked with violent convulsions. I now repented of my ill-judged complaisance, and immediately drew six ounces of blood from the arm, when her pulse, from being labouring and depressed, became full, regular and flowing; and, in obedience to these monitors of restored arterial excitement, I contented myself with the small evacuation of six ounces of the offending fluid at that time.

In a few hours her pulse became tense, with excessive vascular action, and the loss of twelve ounces more reduced it to a regular, equable state. The exacerbation of the night was attended with convulsions, but the additional evacuation of ten ounces transformed her fever into a mild remittent of short duration, without injury to the child.

The states of the pulse, in these mixed forms of disease, require great attention. The labouring throb of convulsive action must first be reduced to an equable fulness, and afterwards prevented from running into the more simple, but still morbid state of tension and quickness.

A second case of convulsions presented itself in February last. The first affection was a paralysis of the right arm in thirty-six hours, attended with violent and general convulsions. When called, I found her pulse hard and depressed, and proposed bleeding. Her friends objected, from the apprehension of its injuring the child; but, taught by previous experience, to be responsible to my own judgment, where I am the only professional attendant, I drew eight ounces of blood, when her pulse rose; and a few hours afterwards drew twelve ounces more. The consequence was, the next day my patient left her bed, and her relations confessed the unexpected advantages of blood-letting in pregnancy. In a few days she had a comparatively easy labour, and now nurses a healthy child.

5. "That young women who have their full quantity of blood, their flesh firm, their bodies strong and agile, and *inured to exercise*, scarcely ever suffer abortion, &c. whereas, they are most subject to miscarry who are of a tender constitution, have lax muscles, a feeble pulse, and too little blood." Here I agree with Dr. Lobb, and "*from fact*" too. Young and vigorous women are certainly much less liable to suffer from the mechanical effects of pregnancy than those of ten-

der constitutions. It should also be observed, that the former have regular and moderate menstruation, compared with the latter. Weakly women sometimes menstruate every two or three weeks, and often to excess. The relaxed state of their solids cannot restrain the topical congestion of the uterine vessels, or check the hæmorrhagy when it has taken place. They therefore suffer a much greater change of condition, by impregnation, than their vigorous and healthy competitors for maternal happiness.

It is also worthy of remark, that "women of tender constitutions and relaxed muscles" have comparatively easy labours. Little resistance exists to the contractions and projectile force of the uterus; whereas, women of firm solids frequently suffer beyond all description. And, it is justly observed by Dr. Rush, in his "defence of blood-letting," that direct debility, whether induced by fasting or long and slow diseases, tends alike to mitigate the pains of labour; that he has often observed labours to be short, and comparatively easy, which have succeeded a fever that has been cured by bleeding; and that Dr. Dewees informed him he had often bled when parturition was slow, and that he had always found that he thereby both shortened and lessened the pains of labour.

There are many instances of labour being extended for several days, in women married late in life, owing to a rigid state of the system, and the final birth of the child protracted to the occurrence of indirect debility in the mother. Hence we frequently succeed, in cases naturally desperate, when the nearly exhausted patient is about to sink into a puerperal grave. But how much more safe, easy and expeditious it is, to induce direct debility by blood-letting, and preserve the powers of the system, at the trifling and necessary expense of a few ounces of sanguiferous fluid. The alternative needs not reflection.

An observance of the old maxim, that "an ounce of prevention is worth a pound of cure," will not only relieve the distresses of pregnancy, but lessen the sufferings of parturition, in a surprizing degree. Pain is not the only distressing attendant of labour: oppression at the breast, impeded respiration, spasmodic affections of the bowels and lower extremities, hysteria, head-ach, and sometimes convulsions, claim a place in the list of concomitants; and timely evacuations will alone prevent or remove those evils.

With regard to the general management of women with child, says Dr. John Clark,* we ought always to remember,

* Practical Essays, &c.

that the progress of the future labour, and its consequences, will depend very much upon the previous state of the patient's health. In every thing, therefore, which we recommend to pregnant women, we should consider the effect which may be thereby produced upon the labour, and upon the health of the woman afterwards.

He then proceeds in his directions on the management of pregnant women, considering the natural disposition of this state as verging towards plethora, and *diseases of increased action*. His recommendation of abstinence and evacuations is earnest and impressive, especially in affections of the chest, so that our pregnant patient may fall into labour in perfect health. But, agreeably to the position of pregnancy being a diseased state, we must renounce the expectation of procuring health before delivery, and endeavour to conduct our female friends into parturition in as simple a state of disease as possible; with the opposing powers of the system nicely balanced—the thoracic viscera prepared to sustain the pressure of the encroaching uterus—and the associating functions of childbirth fitted to co-operate in the ultimate office of delivery; which is all that can be expected from previous medical aid.

Dr. Rush, in his happy method of extenuating the ills of human life, observes, that pain is probably not necessarily connected with child-bearing; and that many of the other evils inflicted upon the human race, in consequence of the disobedience of our first parents, have been lessened or eradicated by the ingenuity of man.

I now submit the inquiry into the utility of occasional blood-letting in pregnancy, on this concise view of the subject, to my professional brethren, with due deference to the opinions of those who confine the operation to the more urgent complaints of utero-gestation, requesting an unprejudiced consideration of the following corollaries.

1. The catamenia is a constitutional hæmorrhagy, immediately formed by topical congestion, and preparatory to impregnation.

2. The frequency and quantity of the catamenia depend also on the state of the solids, and are abundant in relaxed habits.

3. The general change of condition consequent to pregnancy is greater in feeble than vigorous constitutions.

4. The necessary disposition of pregnancy is towards plethora, or a progressively diseased state, with morbid uterine excitement.

5. Women of delicate or relaxed habits are most susceptible of disorder from incidental irregularities, and require special attention.

6. Many of the present complaints of pregnancy are to be imputed to the influence of refined modes and manners in producing effeminacy.

7. Effeminacy is the secondary cause of most of the concomitant ills of pregnancy.

8. Abortion, hysteria, &c. occur most frequently in feeble and delicate women.

9. The hazardous complaints of pregnancy are owing to irregular excitement, or oppressed states of vascular action.

10. The restoration of a due balance of force between the opposing powers of the system is the only safe and certain method of relief.

11. Cautious, but not fearful, blood-letting obviates the natural disposition of pregnancy to plethora, preventing a disarrangement of the vascular system, or removing it when formed.

12. Bleeding is more frequently and essentially necessary in women "of tender constitutions," than in those possessing full strength, and inured to exercise.

13. The dangers of blood-letting are to be sought for in the *abuse*, and not in the careful use of the operation.

14. Most of the objections to blood-letting in pregnancy are predicated on the supposed diminution of the aggregate exciting powers of vascular action, without regard to the perpetually augmenting influence of the distended uterus.

15. Instead of a woman suffering depletion by impregnation, several pounds of fluid are retained, and transformed into fœtal organization.

16. So far from a woman never being "in so much want of blood, in any period of her life," as during pregnancy, she never is so much burthened with a plethoric disposition, and never bears repeated blood-lettings with so much safety and advantage as in this diseased state.

Lastly. Agreeably to the position of pregnancy being a diseased state, consisting of morbid excitement in the uterus, the efficacy of judicious blood-letting, in obviating and relieving most of the incidental complaints of pregnancy—in removing habits of abortion and premature parturition, and in facilitating mature labour, will, I flatter myself, be admitted by every impartial inquirer.

ARTICLE VI.

OBSERVATIONS *on the* CONVERSION *of* IRON *into* STEEL: *In a Letter from the Rev.* JOSEPH PRIESTLEY, *LL. D. to the Editors.*

ACCORDING to the antiphlogistic theory, iron becomes steel by imbibing *carbone*. To this is said to be owing the addition to its *weight* in the process of cementation; and the black flakes which remain undissolved after the solution of steel in diluted vitriolic acid, is said to be *plumbago*, or carbone united to iron.

I cannot, however, help concluding, from some late experiments, that iron is converted into steel by imbibing only phlogiston from the charcoal with which it is cemented, and that the addition to its weight is not from *carbone*, but from *finery cinder*.

Having made a quantity of iron filings perfectly pure, by first expelling from them all the air that they would yield by heat, then washing out any carbonaceous matter that might be contained in them, and again exposing them to heat, I took 120 grains of them, and, heating them with a burning lens in inflammable air, they imbibed eighteen ounce-measures of it.

In consequence of this, from being of a dark colour, they became exceedingly bright, and I concluded that they had now become steel, though I could not prove it by any decisive experiment. But, after dissolving them in diluted vitriolic acid, a quantity of black matter, as from the solution of steel, remained unaffected by it. This being heated in inflammable air, imbibed a considerable quantity of it; and then, by means of diluted vitriolic acid, it gave inflammable air very copiously. This black matter, therefore, had evidently the properties of finery cinder.

I then dissolved 200 grains of broken *watch-springs*, which are undoubtedly pure steel, and collected from the solution three grains of black matter. Heating this in inflammable air, it imbibed a great proportion of it, and then, by means of the diluted acid, it gave inflammable air as copiously as iron or steel filings would have done. This black matter, therefore, was finery cinder, and not carbone or plumbago; and, as iron acquires weight by becoming finery cinder, and this weight I think I have proved to come from its absorption of *water*, it can hardly be doubted but that this addition of

weight to iron, in becoming steel, is from the same cause. Indeed, I believe it to be impossible to expose iron to a red heat in circumstances in which there is any possible access of water, or of air which always contains water, without a partial calcination of it, that is, its becoming, superficially at least, finery cinder.

This was evidently the difference between the solution of the watch-springs, and that of an equal weight (viz. 200 grains) of broken *polished needles*, which had not undergone any calcination: for the black matter that remained from the solution of them would not have weighed a quarter of a grain. Giving colour to steel (which is done to the watch-springs) is always a partial calcination of it, and this appears, from the preceding experiments, to be a conversion of part of the metal into finery cinder, which is the reverse of plumbago, being, according to the new theory, an *oxyd* in the highest possible degree; whereas, if plumbago contain any oxygen, it is in the lowest degree.

ARTICLE VII.

FACTS *to show that both* SEPTIC ACID *and* VOLATILE ALKALI *are formed during the* PUTREFACTIVE PROCESS: *In a Letter to Dr.* MITCHILL, *from Mr.* ISAAC BRIGGS, *dated Sharon (Maryland), 5th of 8th Month (August),* 1802.

MY FRIEND,

ON attentively perusing thy papers, and those of thy correspondents, on the subject of an acid gas produced in putrefaction, and of its pestilential effects, the reasonableness of the theory gained my assent. But, deeming it unphilosophical *implicitly* to adopt any theory, I was induced to try, to the extent of my limited circumstances, and small stock of chemical knowledge, its applicability as a solution of those phenomena of nature which came under my observation. In the course of this investigation I acquired some new ideas, which I now respectfully submit to thy examination.

In the first place I will simply state a few facts, and then offer, as the best solution which has yet occurred to my mind, some remarks. If they furnish, to the learned chemists of the present day, matter for reflection and experiment, so as to

cause the developement of one useful truth, or the elucidation of one mysterious operation of nature, resulting in the augmentation of a knowledge which may increase the comforts, or tend to preserve the health of man, my object in offering them will be accomplished. If truth be but discovered, it will be of small importance to me whether it be found in the establishment or in the refutation of my opinion. Even in the latter case, if I can provoke inquiry, I shall console myself with the belief, that I have cast my mite into the treasury of useful science.

Having failed to get my manure out upon my fields in the spring of last year, it lay in a considerable mass, during the whole summer following, in my barn-yard, which is situated on a declivity facing the south-east, and is bounded, on its lowermost margin, by a bank of earth, for the purpose of preventing the loss of the soluble parts of the manure by rains and thaws. Above this bank, and contiguous to the main body of manure, which was several feet in thickness, stood a considerable pond of water throughout the summer. Besides the vegetable and excrementitious animal matter of which the manure was composed, there were buried in it the carcases of three small hogs. Two of them were buried by a servant, carelessly, and not more than twelve inches beneath the surface. A few days afterwards (the weather being very warm) a cloud of dense vapour was seen, each morning, hovering over the spots where these carcases were deposited, and the cadaverous smell became intolerably offensive to a considerable distance. I then had about half a bushel of dry, air-slaked lime spread over each grave. The vapour was soon repressed, so as to be scarcely visible; the fœtid effluvium was reduced to a very small space, and, even over the very spot, so attenuated as to be supportable. The third carcase was deposited in the manure-heap, about ten inches deep, in a situation the most favourable for putrefaction: the bottom and sides of this grave were lined with lime, the carcase covered with it, and manure thrown over the whole to the thickness of three or four inches. In this case also the quantity of lime was about half a bushel. I never discovered that the atmosphere received the least taint from this carcase.

It was my practice to mow weeds, and to throw them into the edge of the pond.

During the ninth month of last year (September) the weather being uncommonly hot, the appearances of the water of this pond were curious, and to me interesting. Its whole surface

was covered with a scum, which, as the day advanced, gradually exhibited the different shades of colour, from a dirty green in the morning, to a tint as red as blood, which continued during the hottest part of the day. In the afternoon, as the heat declined, there was a progression of shades from this blood-red to a yellowish green in the evening.

These phenomena were daily repeated during the hot weather. Whether they have been noted before by others I know not; but to all my acquaintance who viewed them, as well as to myself, they were entirely new.

I consider the red colour, incumbent upon the water, as a strong indication of the presence of an *acid*, and the green colour as equally indicative of the presence of an *alkali*. The weeds thrown into the pond, I suppose, furnished a colouring matter, possessing, in some degree, the properties of litmus.

In the putrefactive process, it appears to me probable that both an acid and an alkali are produced, at least where much water is present; the water being decomposed, its oxygen combines with a part of the septon, forming septic acid, and its hydrogen with another part of the septon, forming ammonia.

The opinion that ammonia is formed in spontaneous putrefaction is not new; but most chemists, I believe, fixing their attention upon this, have too much overlooked the production, from the same source, of the active, volatile *acid*, which, like a true leaven, is the *parent* as well as the *offspring* of corruption. This valuable discovery was reserved for thee. I believe it is founded in truth; but I see not that we are hence under any necessity of denying the production also of volatile alkali.

It is my opinion that both volatile septic acid and ammonia are produced in spontaneous animal decomposition: and from this hypothesis I infer, that whenever the acid and alkali are produced in such proportion as just to saturate each other, septite of ammonia is formed, and no mischief ensues; that whenever the alkali is in excess, its action, if not salutiferous, is at least innocent; but that whenever the acid is produced in greater quantity than the alkali can neutralize, its superabundant part, left free, is probably wafted about, loading with morbific miasmata the wings of every breeze.

The following question is often triumphantly proposed by the advocates of *imported* pestilence and specific contagion:—"If," say they, "a something, proceeding from the putrefaction of animal and vegetable substances, be the parent of malignant fever, and if the same cause uniformly produce the

same effect, why are our cities *sometimes* desolated by yellow fever, and not always so, when they contain masses of putrefying substances equally great and numerous? Nay, why is there often *no diminution* of usual health, when this supposed cause apparently exists in full force?" Then taking it for granted that this question cannot be answered, nor their other objections* surmounted, consistently with the theory of domestic origin of pestilence, it is pronounced "frivolous, inadequate and groundless."

If both septic acid and ammonia be produced in the process of putrefaction, many adventitious circumstances, the tendency and measure of whose agency we have not yet ascertained, may vary the result, as to the predominance of one or the other of those volatile products, so as, in my opinion, to account for this apparent variance of cause and effect: for instance, different degrees of heat may vary the facility of the disengagement of septon, and may cause its oxygenation as well as hydrogenation in different degrees. Hence may result innumerable differences, both in quantity and quality, in the acid and alkaline products, with very different appetences for each other, and for surrounding substances. Different proportions, also, of water may greatly augment the variety.

This subject may receive much light from experiments judiciously and candidly conducted, and from observation of, and deductions from, the phenomena of nature, made by those whose love of truth is simple—free from bias, in favour of, or against, any particular theory or political interest.

For my opinion that the products of putrefaction are both acid and alkaline, and subject to great variety, I solicit no favour, except so far as it may have truth for its basis.

As water seems to be the principal substance from which hydrogen is derived in any considerable degree, and as this is essential to the formation of ammonia, it follows, that the

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quantity of water present, in a moist atmosphere or otherwise, has a primary influence on the pestilential effect of putrefaction. I wish the *hygrometer*, as well as the thermometer, may be generally used and accurately noted on these occasions.

I have made several experiments, in which I think I have plainly detected ammonia, mostly in combination with an acid, in the results of spontaneous putrefaction. These experiments, together with additional ones, may be the subjects of future communication, if the present be worthy of notice.

I am, respectfully, thy friend,

ISAAC BRIGGS.

ARTICLE VIII.

OBSERVATIONS *on* SCARLATINA CYNANCHICA; *by* FELIX PASCALIS, *M.D. in a Letter to the Editors, dated Philadelphia, Feb.* 8, 1802.

WE have been visited during the last winter month, by the *Scarlatina Anginosa*, or *Cynanchica* (scarlet sore-throat). This epidemic, I suppose, originates, like all others, in certain specific and deleterious principles of the air, or of our aliment. But whenever it is formed, it is either aggravated by acting and re-acting circumstances, or, if it is counteracted by the predisposing habit of the patient, it unexpectedly proves a very mild complaint. Thus we had two distinct species of the scarlatina cynanchica. Neither prevailed universally; and the worst kind seemed to affect children from the cradle to the age of twelve years. Few adults, except those who were foreigners, have fallen victims to this disease.

Epidemics of rare and distant occurrence are very embarrassing in medical practice. Some time elapses before we have collected all written documents, and recollected our own observations; and if there are but few or confused precepts on their treatment, we cannot place an absolute confidence in our best applications.

In many respects our scarlatina anginosa was similar to that which Fothergill investigated in London, during the years 1747 and 1748, and which, a century before, had pervaded almost all the southern countries of Europe. Withering has still better described the symptoms of the scarlatina, as it prevailed at Birmingham in 1778; so that the disease cannot be

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mistaken for the malignant or putrid sore-throat, *morbus strangulatorius, suffocativus*, &c. We have likewise a very true description of it by Sauvages, as it raged in Montpellier in 1765. The same I have seen frequently in the most southern parts of France.

Whether this disease is always a concomitant of others, such as the small-pox, measles, and cynanche tonsillaris and trachealis, we have not sufficient authority to affirm: thus much, however, may be said, that it appeared with the measles at Birmingham, and in Philadelphia, where the latter epidemic has not yet subsided, since the beginning of the summer.

Our scarlatina cynanchica was preceded by a few days of stupor and unusual weariness, with a slight painful sensation in the throat, and sometimes in the neck and back part of the head. Children who could speak complained of an alternating chilliness and flushing heat, head-ach and sickness. In this stage of the disease, many of the worst cases were marked with delirium, convulsive motions of the muscles of the face, and grinding of the teeth. On the second and third day the soreness of the throat had so much increased that deglutition was very painful; yet the tonsils and salivary glands were little enlarged; but the tongue, velum palati, and fauces, were uncommonly red. Already the face and neck appeared flushed; and, from the breast down to the pubes, a florid redness seemed to be produced by innumerable small pimples and pustules. This eruption sometimes extended to the lower extremities, and over the shoulders and the hips.

Convulsions and delirium in some cases, and great restlessness in others, were observed; and every symptom changed according to the impending issue of the case. If fatal, on the fourth day the scarlet eruption abated, the belly swelled, the skin became rough and dry, and the redness of the cheeks and lips gave place to a livid paleness of the face. The patient experienced an uncommon thirst, without ever swallowing but a few drops; his mouth became parched, and his pulse was small, quick and feeble. The breath was offensive, respiration tremulous and accelerated; and, at last, any kind of medicine would induce a colliquative diarrhœa. In a few hours death ensued, marking the surface of the body with a dark brown ecchymosis. But on the fourth day the case might take a far different and more favourable aspect: the scarlet eruption might change into a brownish colour, some moisture be perceived on the skin, and the submaxillary glands become

more tumefied. Although the pain of the throat and the difficulty of deglutition were augmented, and the tongue seemed covered with a black or yellow crust, still a favourable discharge of purulent matter was effected from the nose and mouth. Branny scales were discovered on every part of the body, and gangrenous sloughs were discharged from the fauces.

I have not seen, in this stage, the same external effects of mortification, or of hæmorrhage from the ears, &c. as many writers relate; but I believe parts were frequently spotted, and a few gangrenous sloughs detached from them. Notwithstanding, the bowels were regular, and obedient to operations; the urine appeared natural, and the pulse equal, although quick and febrile. In short, in this stage, the scarlatina cynanchica existed no more, except by its effects; the case was merely a typhoid disease, with more or less of those accidents, which were to be referred either to the identity of the attack, or to the age of the patient.

Dissection has, as yet, afforded but little elucidation as to the nature of this disease. Withering mentions one only of Sennertus, who found great ravages in the lungs and the liver. But these, I have reason to believe, cannot be ascribed to the scarlet fever; they must have been the result of some previous complaint. A boy of eleven years old was, on the fourth day, carried off, with the most severe symptoms of the epidemic. Permission of opening the body having been obtained, no alteration was discovered in the lungs nor in the liver. The trachea and the stomach were likewise in a very sound state. The fauces, it is true, the glottis and tonsils, were remarkably livid. But, on the other hand, the large intestines were mostly mortified, and all the glands of the mesentery were considerably enlarged and indurated. In this case also I am prevented from drawing any positive conclusion, for the child was supposed to have been previously labouring under some consumptive disorder.

I have heard many eminent physicians describe two very different degrees of the scarlatina cynanchica. Thus, while natural exertions will be sufficient for the management of a mild case, we may be at a loss to fix upon the best mode of treating the gangrenous scarlatina. Medical writers have rather increased our perplexity on this subject, by informing us that certain remedies have either failed or succeeded, when they have neglected to form indications to rule the practice and exhibition of medicines. The prolix treatise of Withering de-

termines nothing but a preference in favour of emetics and diuretics. Can it be conceived, however, that, in an inflammatory and malignant disease, any remedy, such as bleeding, purging, sweating, tonics, acids, opium, blisters and bathing, could all and severally prove abortive, or contrary to necessary indications?

Judging from our experience with Dr. Withering's favourite resource of emetics, we find that they answer very well in the beginning of the disease, to discharge the contents of the stomach, to dispel the impending influx of fluids in the fauces, and to keep up the scarlet eruption on the skin until its desquamation is produced. But this first period of the disease is short; and the more intense it is, the greater is the danger of promoting, even with mild medicines, an inverted operation, when a fatal diarrhœa will soon put an end to the struggle and the life—*quæque miserrime vidi.*

As for his diuretic (fixed vegetable alkali), it afforded relief if given as a *citrate of pot-ash.* It promoted salutary discharges, but its operation did not concur with the principal indications of the treatment; and hence I may show the efficacy of many of the remedies rejected by, or unknown to Dr. Withering.

Three things are striking when the scarlet cynanche has favourably passed the periods of invasion and *maturation.* These are, 1st. The efflorescence or desquamation on the skin; 2dly. The suppuration or discharges of the mouth, nose and ears; 3dly. The gangrenous sloughs from the fauces, or the gangrenous spots, abscesses, vibices, &c. on any part of the body. Of whatever nature the poison or virus of the disease may be, it is surely requisite to aid its dispersion in the most natural manner; viz. the scarlet desquamation should be carefully promoted; the suppuration in the fauces should be accelerated; and the gangrenous tendency in the system should always be counteracted.

In the first instance one or two emetic and diaphoretic remedies will prove highly beneficial; but how much more effectually the second end will be answered by calomel, is evinced by the happy concurrence of many facts. A dose of four or five grains, with an equal quantity of camphor, mixed with some jelly, may be repeated every three or four hours, and seldom continued longer than three or four days, when the purulent discharges from the mouth will be sufficiently promoted, and when bark, wine, opium, and even alcoholic mixtures, will effectually oppose the gangrenous tendency.

If we attend to several circumstances, throughout the different stages of the disease, it will appear obvious that its invasion and action must accumulate such excitement, that bleeding and warm bathing ought sometimes to be resorted to for the relief of convulsive and inflammatory symptoms. But, after the desquamation and discharges of the mouth have taken place, as the disease is transformed into a typhoid affection, in which a direct debility is induced, it will demand the use of all stimulating remedies, among which blisters are particularly successful.

The exhibition of mercury in scarlatina cynanchica, assisted by a medical process, according to the above-mentioned intentions, has never been unsuccessful, as far as I employed it, in a few cases of the most intense malignancy. Yet much benefit is to be ascribed to calomel, according to the recommendation long ago given to it by Dr. Samuel Bard, of New-York, in his essay on the sore-throat, or *Morbus Suffocativus*,* and which, perhaps, differed but little from our epidemic. Had I no other authority, I must acknowledge that I should have been sufficiently encouraged by Dr. Rush, in one of those remarkable cases in which the organical powers were so much prostrated and injured that life was despaired of.

P. S. In the Medical Repository, vol. v. p. 39, a case is related of the tape-worm being effectually discharged by using the decoction of Fern.

Is not this plant the *Polypodium Filix Mas* of Linn. class *Cryptogamia*, called *La Fougere* by the French?

Does not its pulverized root constitute the famous remedy of Mrs. Nouffer, of Switzerland, against the tænia or tape-worm?

Did not Lewis XVI. King of France, order the remedy to be bought, and published, as it is, in many books, and especially in the Pharmacy of Beaumé?

Was the gentleman who used it unacquainted with this form of the remedy before he prescribed the decoction, or did he not rely upon the method of exhibiting the root itself in powder? If so, I take the liberty to inform him that I was once present at the operation of two drams of the said powder, which, in twenty minutes, expelled from the body of a Russian Captain as many feet of a tape-worm as to fill up a quart bottle! F. P.

* Vide American Philosophical Transactions, vol. i.

REVIEW.

ART. I. *Memoir on the Supply and Application of the Blow-Pipe. Containing an Account of a new Method of supplying the Blow-Pipe, either with Common Air or Oxygen Gas; and also of the Effects of the intense Heat produced by the Combustion of the Hydrogen and Oxygen Gases. Illustrated by Engravings. Published by Order of the Chemical Society of Philadelphia; to whom it was presented, by* Robert Hare, *jun. Corresponding Member of the Society.* 8vo. pp. 34. *Philadelphia.* Maxwell. 1802.

HOW long a time elapsed, after the creation of man, before he became acquainted with the use and management of fire, is not precisely known. An agent so conducive to his wants would, in all probability, be soon discovered, and enlisted in his service. This is so generally the fact, that we are almost inclined to doubt the relations of those early navigators who have told us that the inhabitants of the Canary and Landrone Islands were ignorant of the use of fire, and expressed great astonishment when they first beheld fuel in a blaze. The most rude and untutored nations know how to kindle and excite it by friction or collision: and the volcano and lightning furnish it without the aid of human hands.

The surface of the earth abounds with inflammable materials. Whether fire was communicated to these by art or by nature, it must have been soon discovered that a gentle motion of the atmosphere would brighten and spread it, or would even kindle it into a flame. The distinction between fire in the form of a *steady coal*, and of a *wavering flame*, was soon attended to. All knew that, in the former, its progress was slow, its heat moderate, and that it was very apt to become extinct; while, in the latter, the production of blaze was the immediate cause of augmented heat, of greater rapidity in the spread of it, and of augmented strength in decomposing the substance which afforded it. Thus untutored man, or man tutored only by the plainest lessons of practice, learned that, in kindling a fire, the great object of solicitude was "the blaze."

To accomplish this desirable end, various expedients were tried. The discoveries of *tinder* and of *punk*, to receive a

spark, and to preserve it from extinction, were of high importance: but their advantages were limited. Though they and certain other *carbonic* substances would retain fire for a long time, they were unable to communicate and diffuse its activity, with the requisite speed, around. Something else was necessary: and it soon appeared that there were numberless substances which possessed the double property of burning *without flame* in a low temperature, and of *exhibiting that brilliant phenomenon*, if the heat was sufficiently increased. Bodies possessing this *two-fold* character were so abundant, that the enumeration of them would be, with perhaps a dozen exceptions, scarcely less than a catalogue of all animal, vegetable, and mineral inflammables.

Thus the strong and characteristic difference between "ignited coal" and "ignited vapour" very soon arrested the attention of man. He knew, that to have a powerful and diffusive fire, he must have "ignited vapour:" and he employed himself, from time to time, in devising the means of procuring it. His first essays were probably no more than imitations of the breeze which brushed through his little pile of dry and kindling sticks. He put the air in motion by winnowing or fanning; and a broad leaf, a fragment of bark, or a bunch of feathers, might have rudely answered the purpose. By such aids, the phlogiston might have been more expeditiously separated from its carbonic associate, and have gratified him as it ascended on wings of flame toward the skies.

It was very natural to apply the breath of his mouth to assist in the ignition of coal, and the burning of phlogistic gas. A full inspiration of common air, driven through the half-contracted lips by the force of the muscles which the will brought into action for the purpose, was found to be very serviceable in exciting flame. The stream might be weak or strong, scanty or copious, as the operator pleased; and whether he blew the coals gently, or urged them with a full blast, he may be said, as he inclined toward the fire on his hands and knees, to have first brought into action the principle "of the bellows."

But he soon found inconveniences in this mode of kindling his fire; for, by too near an approach, his face was often scorched by the heat, his eyes dazzled by the light, and throat and nostrils irritated by the smoke. He, however, soon satisfied himself that nearly the same purpose might be answered, if, standing at a short distance, he could apply the force of his *pulmonic bellows* to act upon the fuel through the medium of

a hollow cane or tube. A straw, a reed, or the pithless stem of a burdock or a parsnip, afforded such a vehicle for the transmission of his breath. And as he adapted his lips to this *pipe*, and *blew* through it, he made the original experiment on the *blow-pipe*.

Art travels fast in the foot-steps of nature. In process of time, a machine was contrived upon the principle of the human lungs and their auxiliary reed. By an apt shape and disposition of certain pieces of leather, wood and iron, an instrument was constructed with a valve, to admit atmospheric air at one opening, and to expel it at another. To this other aperture a metallic pipe of a conical figure was adapted. In short, *the artificial kindling or culinary bellows, with its projecting nozzle*, was invented.

This piece of apparatus enlarged the dominion of man very materially, by giving him greater command of fire. By erecting bellows of various sizes and powers, he has been enabled to excite higher heat in his forges and furnaces than could be otherwise accomplished. And great dispatch and economy in some of the most useful arts, to wit, those in which processes upon the metals and earths are performed, have been the beneficial consequences.

Although so much was done, something more was wanted. In the nicer operations upon metals, such as soldering, enamelling, &c. the artists wished for an intense heat, that could be directed to *one* spot, and that a very *small* one. For succeeding the better in these delicate works, the gold and silversmiths neglected the *culinary* bellows, went back to the blow-pipe, and sought the means of employing it more advantageously in connection with the lips and the *pulmonic* bellows. By a little skill in the construction and employment of it, these tradesmen found that it was applicable to many useful purposes, and could melt metals. And they also discovered that *inflammable air*, or *the blaze of a large lamp*, afforded a more convenient and powerful heat than charcoal, or any thing else they were acquainted with.

As trades grew to sciences, and as artists turned to philosophers, this blow-pipe was introduced into the laboratories of the chemists. They likewise blew the blaze of their lamps against the body to be operated upon. So much were they pleased with its effects, that the great BERGMAN made the blow-pipe (tubus ferruminatorius) the subject of an elaborate essay. As, however, there were difficulties incidental to using it with the mouth, a bellows with a pedal was invented to fa-

vour the lungs, to leave the hand at liberty, and to employ the foot. A particular account of this, with a plate, was subjoined to the second volume of Magellan's edition of Cronstedt's Mineralogy.

In all these experiments, the fluid driven upon the burning or flaming body was atmospheric air. From the beginning, the *burning* body was ordinarily phlogiston. And what is extraordinary almost beyond belief, though flame and its properties of exciting heat have been understood so long, philosophical men, *forgetting that blaze is but inflammable air on fire*, seem, of late, to have thought the economical employment of it was a great and modern discovery!

Mr. Hare, who appears to be a leading and active member of the Chemical Society of Philadelphia, has laboured, after the example of his predecessors, to render the blow-pipe more manageable and useful. Instead of working it by the mouth or the foot, he proposes to propel the air *by the pressure of a column of water*. This he has contrived to accomplish in a very neat, ingenious, and portable machine, which he calls "the hydrostatic blow-pipe." The greater part of the publication is devoted to the description, explanation and application of this new and improved piece of apparatus. On this we should dwell at some length, was it not impossible to give our readers any tolerable idea of it, without the machine itself, or the print which accompanies the work. This, which was drawn and engraved by Mr. James Aikin, gives a clear and satisfactory view of this useful invention. We may mention, however, that it is so contrived as to contain two kinds of air without mixing, and these may be either atmospherical air and inflammable air, or oxygenous air and inflammable air, as the operator pleases. Or he may fill it with atmospheric air alone, to act upon the inflammable air which forms the flame of a lamp. For these reasons it will be immediately apparent how preferable it is to a crucible.

It gives us much pleasure to find the members of the Chemical Society of Philadelphia so intent upon physical researches. From the author of this memoir, so favourably introduced to us by his book, we expect other works, tending to cultivate the fields of nature, and to beautify and enlarge our perspective. It is glorious that the sons of science and of liberty in America are originating and discovering more and more among themselves, and returning a full equivalent for the knowledge they derive from Europe. And it is comfortable that our exports will probably soon exceed our imports.

We extract the following passage, which will serve at once as an example of Mr. H.'s manner of writing, and of the effects wrought by his hydrostatic blow-pipe. (p. 30.)

"I shall now describe the changes effected on the most fixed and refractory substances, by the flame of the hydrogen and oxygen gases.

"In order to avoid a tedious recurrence to an awkward phrase, I shall generally, in the subsequent part of this paper, distinguish the flame of the hydrogen and oxygen gases by the appellation of *gaseous flame*.

"By exposure to the *gaseous flame*, either on supports of silver or of carbon, barytes, alumine, and silex, were completely fused.

"The products of the fusion of alumine and silex, were substances very similar to each other, and much resembling white enamel.

"The result of the fusion of barytes, was a substance of an ash-coloured cast, which, after long exposure, sometimes exhibited brilliant yellow specks. If it be certain that barytes is an earth, these specks must have been discoloured particles of the silver support, or of the pipes from which the flame issued.

"Lime and magnesia are extremely difficult to fuse, not only because they are the most refractory substances in nature, but from the difficulty of preventing them from being blown on one side by the flame; nevertheless, in some instances, by exposure on carbon to the *gaseous flame*, small portions of these earths were converted into black vitreous masses. Possibly the black colour of these products of fusion may have been caused by iron contained in the coal; for, in the high temperature of the *gaseous flame*, a powerful attraction is reciprocally exerted by iron and the earths.

"Platina was fused by exposure on carbon, to the combustion of hydrogen gas and atmospheric air. But the fusion of this metal was rapidly accomplished by the *gaseous flame*, either when exposed to it on carbon, or upon metallic supports.

"A small quantity of this metal, in its native granular form, being strewed in a silver spoon, and passed under the *gaseous flame*, the track of the flame became marked by the conglutination of the metal: and when the heat was for some time continued on a small space, the lump of fused platina became immediately formed.

"About two penny-weight of the native grains of platina, when subjected to the *gaseous flame* on carbon, became

quickly fused into an oblate spheroid, as fluid as mercury. This spheroid, after being cooled, was exposed as before. It became fluid in less than the fourth of a minute.

"Had I sufficient confidence in my own judgment, I should declare that gold, silver and platina, were thrown into a state of ebullition by exposure on carbon to the *gaseous flame:* for the pieces of charcoal on which they were exposed became washed or gilt with detached particles of metal, in the parts adjoining the spots where the exposure took place. Some of the particles of the metal thus detached, exhibited symptoms of oxydation.

"As the fusion of lime and magnesia, by exposure on carbon, was accomplished with great difficulty and uncertainty, it became desirable that means might be discovered of effecting this fusion with greater ease.

"By the union of the base of oxygen with iron, the whole of the caloric of this elastic fluid is supposed to be extricated. This consideration, together with some practical remarks on the heat of burning iron, induced me to employ the combustion of this metal, in conjunction with that of the hydrogen and oxygen gases.

"Some pieces of iron wire, each of about half an inch in length, were quickly thrown into fusion and rapid combustion, by exposure on carbon to the *gaseous flame.* When either lime, magnesia, barytes, alumine, or silex, were thrown on the iron in this state, they became instantly melted and incorporated with the metal. It remains a question, whether, in this case, the earths were fused or dissolved; and whether the substances which resulted from their union with the iron were mixtures or combinations. If they were combinations, according to the present nomenclature, they should be denominated *ferrurets.*

"The difficulty of igniting some substances which are only susceptible of combustion at very high degrees of heat, has hitherto excluded them from the laboratory. By means of the *gaseous flame*, such substances may be employed with the greatest facility in small analytical operations.

"Of the nature of the substances above described, are the carburets of iron, and some peculiar species of native coal.

"Among the carburets of iron, the English plumbago is esteemed the best. Some pieces of this substance, obtained from the best English black lead pencils, were readily thrown into combustion by exposure to the *gaseous flame*, either on carbon, or on some larger pieces of American plumbago. It

was found that either lime or magnesia were fusible when exposed to the fire thus produced. This, however, may have been caused by the iron contained in the carburet, for the fused earths and plumbago generally adhered to each other.

"There is a peculiar species of native coal found on the banks of the Lehigh in this State, which it is extremely difficult to ignite; but, when exposed to an high degree of heat, and a copious blast of air, it burns, yielding an intense heat, without either smoke or flame, and leaving little residue. By exposure to the *gaseous flame* on this coal, both magnesia and lime exhibited strong symptoms of fusion. The former assumed a glazed and somewhat globular appearance. The latter became converted into a brownish semivitreous mass."

Before parting, we must observe, upon this instructive passage, that the phrase "gaseous flame" appears to us to be an instance of tautology. According to our understanding of the matter, all "flame" is "gaseous;" and the very essence of *flame* consists in its being *gaseous*. If it was not so, it would not be flame. The word flame, then, includes the idea of its being a burning gas. Besides, this is no more a gaseous flame than the blaze of a candle, or of a hickory fire, or a blacksmith's forge; one of which is as much a gaseous flame as the other.—For the analogy between this machine and the thermo-lamp, see our vol. v. p. 463—464, and 474—475.

ART. II. *Transactions of the American Philosophical Society, held at Philadelphia for promoting useful Knowledge. Volume the fifth.* 4to. pp. 328. *Philadelphia.* Dobson. 1802.

ANOTHER volume, published so soon since the appearance of the last, gives a favourable aspect of the enterprize of this respectable association. And the friends of American improvement have additional reason to rejoice in the scientific taste and research which is increasing very rapidly among our fellow citizens. Their highly welcome publication is a continuation of the work, of which an account was given in our vol. iv. p. 65, 179, 408, successively, and which was extended to vol. v. p. 67 & seq.

On examining the book now in our hands, we find several articles contained in it already noticed in our Medical Repository. For instance, the advertisement, in the introduction, concerning the *Magellanic Premium*, was published in vol. v.

p. 349: Dr. Cathrall's *Memoir on the Matter of Black-Vomit*, published herein, p. 117, was reviewed in our vol. iv. p. 163: Dr. Priestley's *Six Essays on Chemical Subjects*, filling the first fifty pages, were also reviewed in the same vol. p. 385: and of Dr. Barton's *Tract on the Poisonous Honey of North-America*, contained in p. 51 & seq. a review was likewise given in our vol. v. p. 47. To these several passages of the Medical Repository we refer our readers; it not being necessary to repeat to them subjects so recently and amply discussed, and to which they can so readily turn.

Having mentioned these things, we proceed to the papers of which there is no account in our work. And of these, the first which presents itself is a paper

On the Ephoron Leucon, usually called the White Fly of Passaick River. By Dr. Williamson.

Until now, the *ephemeron*, or *insect of a day*, was considered as the most short-lived of the animal race. But Dr. Williamson has made us acquainted with an *epohron*, or *insect of an hour*. This is his generic denomination; and he has given the creature the specific title of λευκον, *album*, on account of its *white* colour. He says it belongs to the order of the Neuroptera, and has not been described by the entomologists. They appear every year, about the 20th of July, from the waters of the River Passaick, in the evening, about 35 or 40 minutes after sun-set, and continue to fly for nearly three weeks. Each generation dies, after enjoying life, in the perfect or *imago* state, about an hour, and probably no individual of them ever sees the sun. Their range is not more than two and an half miles on the river, extending only from three quarters of a mile below the bridge at Belville, to one mile and a half above it; and are not known on any other river. Their numbers are so great as almost to look like driven snow. They usually play near the surface of the water; seldom rise more than eight feet above it; and the female lays her clusters of eggs before she dies.—We agree with Dr. W. that this animal, "the insect of an hour that is never at rest," is a subject for a stonger allusion or comparison than the trite *ephemeron*, whose life is four-and-twenty times as long.

Remarks on certain Articles found in an Indian Tumulus at Cincinnati, &c. By George Turner.

This paper chiefly contains descriptive and explanatory remarks on the articles, which are deposited in the society's museum.

A Drawing and Description of the Clupea Tyrannus and Oniscus Prægustator. By Benjamin Henry Latrobe, *F. A. P. S.*

The fish which Mr. Latrobe describes is the *morsch-banker* of the Dutch settlers about New-York, and the *menhaden* of the Mohegan natives. It is of a middle size between a shad and a herring, and of the same family. It visits the American coast in the spring, and continues until late in autumn. It is so numerous, and swims in such large shoals, that it is employed by farmers for manure. Land, improved by these fishes, produces maize and wheat of a most luxuriant growth, but soon loses its richness. During their putrefaction they are very offensive, and sometimes noxious, and, therefore, ought to be buried in earth or compost, and kept at some distance from the dwelling house. When fat, which is generally the case in October, they are very good to eat, and are salted down for winter's use by many careful housekeepers on the sea-coast. Is it the *twaite* of the Severn? (3 Pennant, British Zool. p. 351.)

Mr. L. relates what he saw and learned of this fish, which he calls the *bay-alewife* (clupea *nondescripta**), on York River, in Virginia, in 1797. Having done this, he proceeds to give the history of an insect which infests the fish. This is a species of ONISCUS, a genus of the order *aptera*. He seems to know but one species of it, the *physodes;* though, if he had looked no further than Pennant's Zoology, he might have seen figures of half a dozen other species; to wit, the *oniscus psora*, *lineari*, *marinus*, *oceanicus*, *entomon*, and *oestrum*, found in the British seas only. We have often observed the insect which Mr. L. mentions in the mouths of the *menhaden*, and can bear witness of the general correctness of his observations. There are *thirty-eight* species described in Gmelin's edition of Linnè's System of Nature. Of these it is probably the *oniscus asilus*. We think there is something quaint or forced in calling a weak, harmless and toothless fish *a tyrant*, because he is incapable of dislodging a fourteen-footed louse which has fastened on his mouth and gills; and there appears to be somewhat quite as odd and singular in calling this tormenting reptile *a fore-taster* (prægustator) to his tyrant, when, instead of tasting first to save his master from poison,

* We are not positive whether it is described: if not, the *clupea thrissa* comes nearest to it. E.

he, in fact, is preying upon him, and harassing him with all his might.—We would suggest to Mr. L. when he again examines this fish, to give the history of another animal which adheres to him. The creature we allude to is rooted, or anchored, as it were, in his back and sides, and hangs down along them from a slender and flexible foot-stalk. Frequently there are so many of these *worms* to be seen sticking in the skins of the *menhaden*, that the fishermen throw them away as unfit to eat. From the circumstances of their bodies being roundish, oblong, soft, and affixed to another body, we suspect it to be a species of *actinia*.

Two ingenious pieces of mechanism are described as the inventions of the Rev. Burgiss Allison, A. M. the one being *a newly invented Globe Time-Piece*, and the other *a Pendant Planetarium*. But as these cannot be rendered intelligible without the plates, we refer our readers to memoirs No. XI. and XII. of the volume.

On the Use of the Thermometer in Navigation. By William Strickland.

The author endeavours to show the probability of a current continued from the Gulf-stream, by the banks of Newfoundland, quite to the coasts of Ireland and the Hebrides. Vessels, he supposes, have sometimes long passages from Europe to America on account of the difficulty of stemming this current: and recommends it as desirable to have the Atlantic Ocean explored between the 47th and 60th degrees of latitude, to ascertain the reality and extent of it. In this work he thinks the thermometer may be of service, by determining the heats of different portions of ocean—the Gulf-stream being the warmest.

Mr. Strickland is also inclined to think the thermometer may be useful in ascertaining a ship's situation at sea. The quicksilver falls on approaching banks and shoals in so sensible a manner, that, on the same parallel of latitude, he observed a difference of 20 degrees between the temperature of the ocean out of soundings, and of that which covers the bank of Newfoundland. The mercury rises again when a ship sails from shallow to deeper water. And this is capable of aiding the judgment in approaching shoals, or receding from them. He makes the temperature of the ocean, off the Grand Bank, to be 68 deg. of the neighbouring Gulf-stream 72, and of the water on the Grand Bank itself 52. He states the utility of the thermometer in finding the Gulf-stream, and its northern eddy, so as to enable ships to quicken their passages

from Europe to NewYork, and the south-western ports of the United States.

It seems reasonable that this may be a good auxiliary in navigation, and be employed in addition to the log, the lead, and the quadrant, for conducting vessels securely through the pathless tracts of ocean.

Sur les Vegetaux, les Polypes et les Insectes: i. e. On Vegetables, Polypes and Insects. *By* Dupont de Nemours.

This piece contains a variety of miscellaneous observations on the subjects named in its title. It is printed in French. They appear to be the speculations of a cultivated and fanciful mind. In such works as Bonnet's *Contemplations* and St. Pierre's *Etudes*, they would be well deserving a place; but what do they here?

Observations on the Soda, Magnesia and Lime contained in the Water of the Ocean; showing that they operate advantageously there by neutralizing Acids, and, among others, the Septic Acid; and that Sea-Water may be rendered fit for washing Clothes without the Aid of Soap. By Samuel L. Mitchill.

In consequence of numerous analogies and inductions, Dr. Mitchill has persuaded himself that the *alkaline* matters dissolved in the ocean keep it sweet and wholesome, by the strong antiseptic power which they possess. He shows, in this short, but highly interesting memoir, that they have a further effect, which is to neutralize the *muriatic* acid which is always there, the *septic* which is frequently, and the *sulphuric* which is sometimes contained in sea-water. The three alkalies of *soda*, *lime* and *magnesia*, combine with the three acids, in the order of their respective attractions; and as there is a deficiency of soda, the residue of the acids combine with the earthy bases of magnesia and lime. The consequence of this constitution of ocean-water is, that it decomposes soap by separating the alkali thereof from its oil; and thereby renders it unfit for washing clothes.

Dr. M. is convinced that much of the sickness, fever, infection, &c. on ship-board, proceeds from human nastiness accumulated in cloathing, bedding, births, &c. through want or neglect of *alkaline* detergents. And he proposes, which is the principal object of his paper, to render ocean-water fit for washing, by precipitating the magnesia and lime with pearl-ash and soda. Thus sailors may wash and be clean without either soap or fresh water: for a few casks of pearl-ash, or of barilla,

taken on board as a part of a ship's stores, will be capable of alkalizing sea-water so effectually as to do all the scrubbing, washing and cleaning on board. By this provision soap may be dispensed with, and not a drop of the vessel's stock of *fresh* water be consumed, beyond the daily allowance for cooking, &c. Health and comfort may thus be introduced into naval service, and the engendering of fevers and pestilential distempers on board be prevented. It is easy to foresee, that, upon this plan of cleanliness, quarantines of vessels would be in a great degree superceded, or, if they were insisted on, would be reduced to an exact system of purification.

The *Description of a Hopper for the Openings by which the Sewers of Cities receive the Waters of their Drains, by* John Fraser, *of Chelsea, London* (p. 148), is worthy of being consulted by police officers and city magistrates. The parts have a considerable resemblance to the hopper and shoe of a grist-mill, and seem well adapted to prevent the regurgitation of the fluids which have passed them.

A Memoir on Animal Cotton, or the Insect Fly-Carrier. By M. Baudry des Lozieres, *&c.*

This is the history of a voracious worm, well known in St. Domingo for the damage it does the indigo and cassada plants. It is so remarkable that we give it in the author's words:

"*Its Birth, Growth, and Death.*—The cassada-worm is produced like the silk-worm, that is to say, from the eggs which the mother scatters every where, after she has undergone her metamorphosis into a whitish butterfly, or of a light pearl colour.

"The egg is hatched about the latter end of July. Its developement is quick, for in September the worm is changed into a butterfly.

"This month of September is the season of his loves. The constant motion of his wings shows the ardency of his passion, which he indulges day and night, and even while feeding. The excess of this indulgence soon destroys him: he dies in the same month, after violent convulsions.

"I have said that his life begins at the end of July. He is decked at his birth with a robe of the most brilliant variegated colours. This elegant livery, which nature seems to have delighted in forming, renders him always agreeable to the eye, which always dwells upon it with pleasure.

"*Its Affinities.*—It has appeared to me to be a smooth caterpillar, whose external shape is exactly like that of the silk-worm.

"It differs, however, from it, by its size, by its thickness, and by the beauty of its colours.

"It again differs from the silk-worm, because it does not itself work the cone which I am going to speak of.

"I leave it to the learned to delineate its external configuration, and to determine upon the family of insects to which it belongs. I shall only say that I do not believe it has, like the silk-worm, an intestine going in a direct line from the mouth to the anus, because it appears to me that this cause of elaboration would not have the same destination.

"*Its Food.*—It feeds on cassada leaves, of which it is extremely greedy. It feeds at all hours, day and night. It also nibbles the leaves of the potatoe: this is, however, but a transitory taste: it soon returns to the cassada leaf.

"I have to observe, that after it has taken its food, when the time of its metamorphosis arrives, it does not purge itself by diet, like the silk-worm, but continues to eat to the last moment.

"*The Approach of its Metamorphosis.*—In the month of August, and when on the point of undergoing its metamorphosis, it strips off its superb robe, and puts on one of an admirable sea-green. This fundamental colour reflects all its various shades, according to the different undulations of the animal, and the different accidents of light.

"*The Sting of the Ichneumon Fly.*—This new decoration is the signal of its tortures.—Immediately a swarm of ichneumon flies assail it. I think I am not mistaken when I assert that there is not one of its pores that has not one of those flies fastened to it. There is even no necessity of making use of the microscope to see that he is covered with them.

"In vain he struggles with all his might—raises himself upright to get rid of his cruel tormentors. He must submit. Those flies, of the smallest species, and which can only be studied by means of the microscope, drive their stings into the skin of their victim, over the whole extent of his back and sides. Afterwards, and all at the same time, they slip their eggs into the bottom of the wounds which they have made.

"After having performed this dreadful operation, the ichneumon flies disappear, and the patient remains, for an hour, in a drowsy, and even motionless state, out of which he awakens to feed with his former voracity. Then he appears much larger, and his size increases every day. His green colour assumes a deeper hue, and the tints produced by the reflection

of the light are more strongly marked. The animal, in this state of factitious pregnancy, if I may so express myself, is worthy of all the attention of the observer of nature.

"I shall not undertake the description of the ichneumon fly; it is well described in the books. If I have observed a difference, it is the same which exists between the European *gnat* and the *musquitoe* of hot regions—that is to say, that our West-India flies are of a lesser size.

"I have now to describe the operation which the ichneumon flies, which are extremely small, perform at the very moment of their coming into the world.

"*Animal Cotton.*—A fortnight after the ichneumon flies have thus cruelly deposited their eggs, by perforating the unfortunate cassada-worm, that is to say, some time in the month of August, those eggs may be seen, by the help of a microscope, hatching on the body of that animal.

"Those eggs are all hatched at the same moment, and it is impossible to catch the moral point of time which may intervene between the birth of one and that of another. At one glance, the cassada-worm is seen covered with all the little worms that have just been hatched. They issue out of him at every pore, and that *animated robe* covers him so entirely, that nothing can be perceived but the top of his head. He then turns to a dirty white. The little worms appear black to the eye, but their true colour is a deep brown.

"This operation lasts hardly more than an hour, and is followed by another, which is not much larger, but which is much more curious.

"As soon as the worms are hatched, and without quitting the spot where the egg is which they have broke through, they yield a liquid gum, which, by coming into contact with the air, becomes solid and slimy.

"At the same time, and by a simultaneous motion, they raise themselves on their lower extremity, shake their heads and one half of their bodies, and swing themselves in every direction. Now is going to begin an operation which will afford the greatest delight to the admirer of nature.

"Each of those *animalcula* works himself a small and almost imperceptible cocoon, in the shape of an egg, in which he wraps himself up. Thus they make, as it were, their winding-sheet. They seem to be born but to die.

"Those millions and millions of cocoons, all close to each other, and the formation of which has not taken two hours, form a white robe, in which the cassada-worm appears ele-

gantly clothed. While they are thus decking him, he remains in a state of almost lethargic torpidity.

"As soon as this covering is woven, and the little workmen who have made it have retired and hid themselves in their cells, the worm endeavours to rid himself of those barbarous guests, and of the robe which contains them, but he does not succeed in this attempt without the greatest efforts.

"He comes out of this kind of enclosure entirely flaccid and dull. Instead of his former fat and shining appearance, his skin now appears flabby, wrinkled and dirty, and gives him the appearance of decrepitude. He is now an exhausted, suffering being, threatened with approaching death.

"He will still gnaw a few leaves, but he no longer eats with that voracious appetite which indicated an active and vigorous constitution. Shortly afterwards he passes to the state of a crysalis; and, after giving life to thousands of eggs, he suddenly loses his own, leaving to the cultivator, who has not yet bethought himself of calculating the advantage that he may draw from him, an advantage which may be so improved as to much more than compensate the ravages which he occasions.

"*Shell of the Ichneumon Fly.*—I had imagined that the thousands of little worms which this shell contains in the cocoons of which it is composed, would be hatched some day. I shut it up, therefore, in a box closed with great caution. Every morning, and very often in the course of the day, I examined it, in order to catch the moment when those little animals were to be born a second time.

"In fact, at the expiration of about eight days, I found the inside of the box lined with a cloud of little flies. I made myself certain that they issued out of the little cocoon. Several which issued out of them before my eyes, left me no doubt as to the fact.

"I then took up some of those flies, and, putting them on a pincer, I examined them with a microscope.

"They are bold and lively: they have four wings: their antennæ are long and vibrating: their belly hangs by a very fine thread: there are some that have a tail, and others that do not show it. Afterwards I satisfied myself that they feed upon small insects that appear to be of the family of *Acarus*. Those indications appeared to me sufficient to be satisfied that they belong to the family of the ichneumon.

"*Observations on Animal Cotton.*—I have often held in my hand that cotton shell or wrapper. Its whiteness is daz-

zling. As soon as the flies have quitted the cocoon, it may be used without any preparatory precaution. It is made up of the purest and finest cotton.

"I call it *cotton* because it is *idio-electric*, and is pervious to the electric fluid.

"I add to this denomination the epithet *animal*, in contradistinction to common cotton, which may henceforth be called *vegetable cotton;* so that the two species may be distinguished from each other by their names, as they are by their origin, although they are very nearly related to each other in their effects.

"It is to be observed, that what might be called *cobweb* in the covering of the fly-carrier, or small flocks of silk which are probably intended to shelter the animal from the rain, is far superior to what is called *ferrit* before, and *sleet silk* after the preparation of the finer silk. There is no refuse, no inferior quality in animal cotton. Every thing in it is as fine and beautiful as can be imagined.

"It is possible, if we may form a judgment by analogy, that medicine, which has extracted from silk what is called *English drops*, a remedy to which the greatest efficacy is attributed, may derive a similar advantage, perhaps for the cure of other disorders, from an extract of the animal cotton, which might be called the *St. Domingo drops.*

"In short, there is no need here of any of the precautions which the silk-worm requires. The robe which covers the fly-carrier is worked every where, and every where perfectly well.

"I shall only observe, that as the rain speedily destroys the cassada-worm, the instant might be seized on, when the ichneumon fly has deposited her eggs, to put the fly-carrier under shelter. His natural food might be procured for him, as is done with the silk-worm.

"The ichneumon-fly never fails thus to come and deposit her eggs. I have never seen a fly-carrier that was not covered with the robe or shell that I have spoken of. I have continued this observation for many years, and the crop was so abundant, that I alone could collect, in less than two hours, the quantity of one hundred pints, French measure.

"I repeat it, animal cotton is attended with none of the difficulties which occur in the preparation of vegetable cotton. It is so pure, that as soon as the ichneumons have left it, which happens eight or ten days after their reclusion, it may be carded and spun.

"If it should want any preparation, it could be only in case it should not have been sufficiently guarded against dust and rain.

"Vegetable cotton, besides the seeds that produce it, and with which it is charged, is filled with extraneous matter, of which it cannot be freed, but with a minute attention, many hands and much time, or with the help of machines which have not yet been brought to perfection.

"In every point of view, animal cotton appears to me to have a great superiority over that of the vegetable kind."

Mr. ANDREW ELLICOT, the Geographer-General of the United States, while employed in public service, has preserved a regular diary of some of his transactions. These he has communicated at large to Robert Patterson, Esq. one of the Vice-Presidents of the society. One of these is entitled, *Astronomical and Thermometrical Observations, made at the Confluence of the Mississippi and Ohio Rivers; to which are added, Observations made on the Transit of Mercury, in May*, 1799, *at the Miller's Place, in lat.* 30 *deg.* 49 *min.* 33 *sec. N. on the Coenecuch River.* The other consists of *Astronomical and Thermometrical Observations, made on the Boundary between the United States and his Catholic Majesty.*—The former of these communications is dated August 4, and the latter September 23, 1800. They are drawn out to great length, and contain minute details of the heat, cold, clearness and cloudiness of the atmosphere; of the movements, occupation and employment of the geographer and his attendants; and of the instruments and apparatus, with the method of proceeding, to determine terrestrial boundaries and territorial lines, and to note the corresponding motions and phases of the heavenly bodies. These journals of events are spread over great surface, for they occupy all the part of the volume which is included between the 162d and 311th page inclusive; amounting to almost half the matter contained in the book. They may be useful to future surveyors; but it seems to us the *instructive* parts of the narrative might have been comprized within much narrower limits. Yet we must own there is something highly satisfactory in being able to resort to *original* documents. And, upon the whole, notwithstanding the prolixity and tediousness which we have heard some persons allege against these *Thermometrical and Astronomical Observations*, we have expressed our approbation of the society's vote to publish and preserve them entire.

Mr. E. has settled the mean latitude of the confluence of the Mississippi and Ohio to be 37, 0, 22. 9, N. and the mean longitude 88, 50, 42, W. from Greenwich. (p. 170, 171.)

He has ascertained the mean latitude of Natchez to be 31, 33, 48, N. nearly (p. 190), and the mean longitude to be 91, 29, 16, W. from Greenwich. (p. 189.)

The latitude of New-Orleans he makes 29, 57, 28. 7, N. and its longitude 90, 14, W. from Greenwich. (p. 196, 197.)

The astronomer or statesman who is curious to peruse the account of the steps taken to settle the contested boundary between the United States and the Spanish provinces of East and West Florida, begun in May, 1798, and concluded in 1800, may here find the proceedings at large. The measures adopted to fix the 31st degree of north latitude on the Mississippi, and to traverse the country on a line drawn E. from that point to the source of St. Mary's River, are instructive to the geographer and surveyor. The maps which accompany the descriptions add greatly to their value.

Observations on the Figure of the Earth. By Joseph Clay, *M. A. P. S.*

Mr. Clay having read the Abbè St. Pierre's arguments in favour of the *prolate*-spheroidal figure of the earth, considered them utterly insufficient to establish the position. The object of the present paper is to prove that the earth is an *oblate*-spheroid. In this he has shown a large share of mathematical acuteness.—This subject, which has been violently disputed by great mathematicians, is not yet wholly settled to the satisfaction of *all*. Mr. C. takes the Newtonian side of the argument, and manages it with ability. An instructive and amusing history of the opinions of astronomers and geographers, as they fluctuated between a spheroid *extended* or *flattened* at the poles, has been drawn up by WEIDLER, in his *Institutiones Matheseos*, p. 457 & seq. Be the fact as it may, if, as the best calculators seem latterly to think, the radius of the equator is to the semi-axis of the earth only as 179 is to 178, there is no *great* matter to dispute about.

Description of some Improvements in the Common Fire-Place, accompanied with Models, &c. By C. W. Peale *and his Son* Raphaelle.

This is an addition of what the inventors term a sliding mantle-piece, and valve or damper, to the fire-place, with slanting jambs, recommended by Count Rumford. To get a complete idea of it, our domestic economists are referred to the explanatory plate, p. 322.

To the volume is added an appendix of two communications *on the best method of preventing the premature decay of peach-trees.* The first was written by Mr. John Ellis, of New-Jersey; and the second by Mr. Thomas Coulter, of Pennsylvania. Both were prize-essays for the premium of 60 dollars, which was offered by the society, and adjudged to be divided between the candidates.—These pieces we insert entire for the gratification of our friends and readers who are devoted to rural life.

Account of a Method of preventing the Decay of Peach-Trees. By John Ellis, *of New-Jersey.*

"The decay of peach-trees is owing to a worm, which originates from a large fly, that resembles the common wasp. This fly perforates the bark, and deposits an egg in the moist or sappy part of it. The most common place of perforation is at the surface of the earth, and as soon as the worm is able to move, it descends into the earth, probably from an instinctive effort to avoid the winter's frost. This may be ascertained by observation; the tract of the worm from the seat of the egg being visible at its beginning, and gradually increasing, in correspondence with the increasing size of the worm: its course is always downwards. The progress of the young worm is extremely slow, and if the egg is deposited at any considerable distance above the surface of the earth, it is long before the worm reaches the ground. The worms are unable to bear the cold of winter unless covered by the earth, and all that are above ground after frost are killed.

"By this history of the origin, progress and nature of the insect, we can explain the effects of my method, which is as follows: In the spring, when the blossoms are out, clear away the dirt, so as to expose the root of the tree, to the depth of three inches; surround the tree with straw about three feet long, applied lengthwise, so that it may have a covering one inch thick, which extends to the bottom of the hole, the but ends of the straw resting upon the ground at the bottom. Bind this straw around the tree with three bands, one near the top, one at the middle, and the third at the surface of the earth; then fill up the hole at the root with earth, and press it closely round the straw. When the white frosts appear, the straw should be removed, and the tree should remain uncovered until the blossoms put out in the spring.

"By this process the fly is prevented from depositing its egg within three feet of the root, and although it may place the egg above that distance, the worm travels so slow that it

cannot reach the ground before frost, and therefore is killed before it is able to injure the tree.

"The truth of the principle is proved by the following fact—I practised this method with a large number of peach-trees, and they flourished remarkably, without any appearance of injury from the worm, for several years: I was then induced to discontinue the straw with about twenty of them. *All those which are without the straw have declined, while the others which have had the straw continue as vigorous as ever.*"

Description of a Method of cultivating Peach-Trees, with a View to prevent their premature Decay; confirmed by the Experience of forty-five Years, in Delaware State and the Western Parts of Pennsylvania. By Thomas Coulter, *Esq. of Bedford County, Pennsylvania.*

"The death of young peach-trees is principally owing to planting, transplanting, and pruning *the same stock*, which occasions it to be open and tender, with a rough bark; in consequence of which insects lodge and breed in it, and birds search after them, whereby wounds are made; the gum exudes, and in a few years the tree is useless. To prevent this, transplant your trees as young as possible; if in the kernel it will be best, as there will then be no check of growth. Plant them sixteen feet apart. Plow and harrow between them, for two years, without regard to wounding them, but avoid tearing them up by the roots. In the month of March or April, in the third year after transplanting, cut them all off by the ground, plow and harrow among them as before, but with great care to avoid wounding or tearing them. Suffer all the sprouts or scions to grow, even if they should amount to half a dozen or more; they become bearing trees almost instantaneously, on account of the strength of the root. Allow no animals but hogs to enter your orchard, for fear of their wounding the shoots, as a substance drains away through the least wound, which is essential to the health of the tree and the good quality of the fruit.

"If the old stock is cut away the third year after transplanting, no more shoots will come to maturity than the old stump can support and nourish: the remainder will die before they bear fruit, and may be cut away, taking care not to wound any other stock. The sprouts, when loaded with fruit, will bend and rest on the ground, in every direction, for many years, all of them being rooted as if they had been planted, their stocks remaining tough and their barks smooth for twenty years and upwards. If any of the sprouts from the old stump should happen to split off and die, cut them away; they will be supplied

from the ground by others, so that you may have trees from the same for 100 years, as I believe. I have now trees from one to thirty-six years old, all from the same stump. Young trees, formed in this manner, will bear fruit the second year, but this fruit will not ripen so early as the fruit on the older trees from the same stump. Three years after the trees are cut off, the shoots will be sufficiently large and bushy to shade the ground so as to prevent the growth of grass that might injure the trees, therefore plowing will be useless, and may be injurious by wounding them. It is also unnecessary to manure peach-trees, as the fruit of manured trees is always smaller, and inferior to that of trees which are not manured. By manuring you make the peach-trees larger and apparently more flourishing, but their fruit will be of a bad kind, looking as green as the leaves, even when ripe, and later than that of trees which have not been manured. Peach-trees never require a rich soil; the poorer the soil the better the fruit: a middling soil produces the most bountiful crop. The highest ground is the best for peach-trees, and the north side of hills is most desirable, as it retards vegetation, and prevents the destructive effects of late frosts, which occur in the month of April in Pennsylvania. Convinced, by long experience, of the truth of these observations, the author wishes they may be published for public benefit, and has been informed that Col. Luther Martin, and another gentleman, in the lower part of Maryland, have adopted a similar plan with great advantage."

ART. III. *Observations and Advices for the Improvement of the Manufacture of Muscovado Sugar and Rum. First Part. By* Bryan Higgins, *M. D.* 8vo. pp. 116. *With Plates. St. Jago de la Vega, in Jamaica.* Aikman. 1797.

FROM the time that the sugar-cane was transplanted to the West-Indies, the proprietors of estates experienced a great improvement of their property. On many of those fertile islands this plant grew with great luxuriance, and, reared by the labour of Negro slaves, afforded a very profitable crop. The sweet liquor expressed from this precious vegetable, at a proper season of its growth, gave rise to a triple employment; for, from it, the crystallization of *sugar*, the draining of *molasses*, and the distillation of *rum*, all derive their existence.

To manage with propriety a sugar plantation, required skill both in agriculture and manufacture.

As far as the business of the mere planter extended, there seemed to be no lack of an economical system of labour. The preparation of the soil, the time for planting, the mode of tending, the season of cutting and gathering, were well understood. Nor was there less of knowledge of the constitutions of labourers, the signs of vigour when they were inspected at market, the manner of feeding them, the amount of work they could do, the diseases to which they were liable, with the proper discipline of unconditional subserviency and obedience.

But when the harvest was ripe, a work of greater difficulty remained. The saccharine juice, before it corrupted in or evaporated from the stalk, was first to be extracted, and afterwards to be converted into new and varied forms. Replete with a most fermentible matter, and growing in a heated climate, the management of it required dispatch as well as care. Abounding with water, it was necessary to boil it to dissipate the excess of that ingredient. Growing partially acid in spite of all endeavours to prevent it, there was a necessity to absorb or neutralize the sourness. Being easy of decomposition by fire, much caution was requisite to prevent the blackening of it in the boilers, and the burning of it to charcoal. Charged with crude, adventitious, filthy, or sometimes injurious materials, means were to be devised for purging these away.

All these and other difficulties retarded the preparation of *sugar*. Nor were the impediments smaller which attended the conversion of its skimmings and strainings into *ardent spirit*. Pure alkohol could never be obtained. A portion of empyreumatic oil passing with it through the still, gave it a strong and disagreeable smell. Particles of carbon or soot imparted to it a bitter or other unpleasant flavour. Or an ethereal fluid, formed during distillation, by a junction of acetic acid with nascent spirit, joined itself to the new rum, giving it a burning pungency, or an almost suffocating volatility. Other tinctures or taints, arising from the vitiated or impure mixture of the materials for distillation, rendered the fresh drawn rum too unpalatable for immediate use, except by the lowest of those wretched creatures, who swallow these draughts, as they would take into their stomachs worse ones, for the purpose of intoxication.

Processes so complicated, and accompanied with such manifold embarrassments, could not be brought to perfection immediately. Time, and skill and experience, were to be

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Processes so complicated, and accompanied with such manifold embarrassments, could not be brought to perfection immediately. Time, and skill and experience, were to be

combined in order to economize and simplify such intricate operations. The sense of private emolument was a powerful incentive to the more ingenious and enterprising planters. Knowing the defects of the management adopted both in their sugar-houses and still-houses, they beheld with impatience the wasteful way of working. Expedient succeeded to expedient, and project to project, for the purpose of making greater savings in both the manufactures. Though much was done by the successive exertions of proprietors, overseers and artists of every kind, they all remained sorrowful witnesses, in spite of all they could do, of some irremediable defects in the boiling of sugar and in the distilling of rum.

The agreeable sweetness produced by sugar, when dissolving between the tongue and the palate, and the glowing excitement caused by rum, when acting upon the stomach and nerves, have recommended these two commodities to general use. This is so much the case, that, from having been luxuries, they are now almost reckoned among the necessaries of modern living. Without the former to sooth the mouth, and the latter to warm the belly, multitudes of our fellow creatures would think themselves miserable indeed! The history of such ingredients of human provision and solicitude can scarcely be a matter of indifference to any one. The cultivator studies it as he values increasing thriftiness and gain; and the consumer ought to become acquainted with it through a regard to rational curiosity and health. The active ingredients of diet and medicine are grave subjects of meditation to us all.

The Jamaica planters having exhausted all the resources of practical or empirical contrivance, possessed too much knowledge of what was proper to be done, to abandon the pursuit as desperate. They had recourse to such aid as *Science* promised to afford them. From the numberless benefits which chemistry had showered down upon other useful arts and manufactures, they hoped it might pour forth a portion of its blessings upon theirs. They applied to BRYAN HIGGINS, a respectable physician of London, a man long and deeply versed in chemical researches, for advice. They retained him in their service by an offer of liberal reward, and engaged him to make a voyage to the south-western regions, where their fertile plantations laid waiting for his improvements.

The volume now in our hands was composed in consequence of this accepted mission. It consists of three distinct publications, made between the years 1797, when Dr. H. ar-

rived in Jamaica, and 1801. These were successively printed at St. Jago de la Vega, and addressed to the committees appointed by the legislature of Jamaica to confer with him, and to facilitate his proceedings. But we proceed with the work.

Having the interests of his employers at heart, Dr. H. soon furnished them with a book. From the observations which he made on the plantations immediately after his arrival, he became satisfied that, in order to have good rum, it was necessary to prepare good sugar; and that, of course, all radical reforms, calculated to improve the processes in the still-house, ought to be begun in the sugar-house. The principal points to be carried, for improving the manufacture of muscovado sugar, were these: 1. To quicken the conversion of crude cane-juice to syrup or sugar. 2. To separate the foul, adventitious and putrefactive matter, which unavoidably mingles, in some proportion, with the juice. And, 3. By having thus improved the sugar in colour, grain and purity, to prepare the sweets for distillation, free from acid and corrupting taints.

To the accomplishment of these objects he devotes the principal part of the tract now under consideration. He proposes to effect it by various improvements in the furnaces. He recommends better modes of construction, a more convenient application of heat, and a preferable arrangement of the vessels for boiling. He treats of economizing fuel, of skimming off the light matters which rise to the surface, of filtering the liquor through proper strainers, and of neutralizing the acidity usually prevalent in the juice, especially if kept so long as to ferment. A large part of this tract, therefore, is filled with directions to intelligent planters and operative masons, how to construct the boiling apparatus in the most advantageous manner. In doing this Dr. H. writes much about bars and grates, flues and fire-places, bricks and cements, sizes and dimensions, which we deem it unnecessary to analyze or transcribe. Being expressly calculated for the improvement of the plantations, we forbear to go into minute discussions about them, as they can only be understood in connection with the engravings. Toward the end we find some observations concerning the quickest preparation of muscovado sugar and the improvement of rum, which are worthy of insertion entire, as they throw much light upon these subjects. (p. 94.)

" Sound cane-juice consists of water, sugar, deliquescent sweet, herbaceous matter, carbonic acid, and molasses acid:

And some juices contain variable quantities of other ingredients which are not yet to be noticed.

" In these pharmaceutic ingredients subsist the primary or chemical principles of many vegetable acids. But experience shows that the composition of attractive forces, resulting from such proportions of the principles as take place in the recent juice, tend chiefly to the formation of an acid similar to vinegar, and of an additional quantity of carbonic acid and molasses acid.

" For in the course of 12 or 18 hours the juice mantles by the rise and escape of carbonic acid in the elastic state: At an earlier period it smells sour or acetous; and, by the effect of such delay on the sugar producible from it, it is certain that there is an addition to the original quantity of the molasses acid.

" This last is the ingredient which most powerfully impedes the crystallization and separation of the saccharine matter from the deliquescent sweet and mother-liquor called molasses. As it lessens the quantity of saccharine crystals, and increases that of molasses mother-liquor; and as it is highly probable that molasses contains the like acid as a constituent principle, I give it the temporary name of molasses acid.

" Herbaceous matter is that of which some part shows itself in the *yawing*, and more in the boiling of juice which had been cleared from gross filth by filtration. It is that which we endeavour to separate from the saccharine liquor by *yawing* and skimming.

" The herbaceous matter has some analogy to gummi-resins; but has a much nearer similitude, in chemical character, to the dregs of refined indigo, or that vegetable substance which constitutes the chief difference between the finest and the basest indigo.

" The herbaceous matter of cane-juice, like that of indigo, varies with the constitution of the plant in different soils and seasons, and especially in respect to its solubility: insomuch that some juices hold about $\frac{1}{300}$th part of it in strict solution after boiling, whilst others hold not 1000th.

" But as herbaceous matter is rendered more soluble by the intervention of carbonic acid; any cane-juice holds more herbaceous matter in solution, before it has been heated, than it can retain at the temperature of yawing or boiling.

" For in the augmented temperature, the carbonic acid forsakes the herbaceous matter to combine with that which makes the acid aëriform; the minute gaseous bubbles in their escape agitate and impel the particles lately thrown out of solution,

until, in their coalescence, they become not only visible but large. We may express this change in the clear recent juice by the agency of fire alone, as the workmen do, by saying the liquor breaks.

" Fresh cane-juice begins to break, when the heat approaches to 140 degrees of Fahrenheit; and the herbaceous matter which has felt no greater heat, has an olive green colour.

" Whether this be exposed to greater heat, or we advert to that which is thrown out during the subsequent reduction of the juice to sugar, the herbaceous matter is found to change colour with the increase of temperature, through gradations of yellow, olive, and brown, increasing in intensity and darkness, until the matter is charred to blackness. As it changes in colour it becomes less soluble. The carbonic acid continues to escape, and the extricated herbaceous matter accumulates to the surface, whilst the liquor is heated to 195.

" Now the watery vapour arising with the carbonic acid bubbles, pushes the cleansed liquor, frothing white, through intervals in the swollen scum. This, which is called yawing, shows that a greater heat would cause a boiling commotion. But if sometime be allowed for the residuary carbonic acid to escape, the liquor will not boil until this heat amounts to 206, or within five degrees of the heat of boiling water.

" The aëriform bubbles intangled in the herbaceous matter render it more buoyant than it would otherwise be, and enable it to carry with it, and to sustain at the surface any accidental filth of the liquor: And the scum thus produced is by its own nature sufficiently tenacious to be separable by the skimmer, or by drawing away the depurated juice from beneath it.

" But if the buoying bubbles be expelled by greater heat and the commotion of boiling, the scum will be broken into the liquor.

" The skimmer will now avail nothing; but the herbaceous matter once thrown out of solution will subside with the filth, in an hour, in a cooling quiescent liquor; and will leave it transparent, although it still retain that quantity of herbaceous matter, which the water, with the last adherent portions of carbonic acid, can dissolve.

" But as this depuration by subsidence cannot be awaited without injury to the juice, the foul scum ought to be removed before the liquor boils.

" In consequence of this limited solubility, the residuary herbaceous matter becomes extricated afterwards, in quantity proportionate to that of the watery solvent which is expelled by

evaporation; and the reduced liquor becomes turbid by the extricated herbaceous particles.

" However often the process of evaporation is stopped and the liquor is depurated to perfect transparency, by subsidence, or otherwise; it will become turbid again, by the deposition of herbaceous dregs, when the evaporation is renewed; and it will thus yield dregs to the end; or until the residuary liquor becomes so far saturated with sugar as to be incapable of holding the less soluble herbaceous matter in solution.

" All this takes place, whether a moderate dose of temper be used or not. But the cleansing by subsidence is quickest when temper is used.

" To ascertain the true use of temper, we must advert to its agency on herbaceous matter, carbonic acid, and molasses acid.

" Lime powerfully attracts carbonic acid: And although lime be a soluble body, and although it meet the acid in the aëriform state, it forms with it quickly an insoluble body similar to whiting or chalk.

" Lime also combines with a triple or quadruple quantity of herbaceous matter, to form a compound less soluble than the latter in water: And in cane-juice, lime meeting carbonic acid and herbaceous matter, unites with both to form a triple compound. For if the lime used in clarifiers were to unite with the carbonic acid only, we should find bottoms consisting of whiting, which I have looked for, but could never obtain.

" It is by virtue of these relations, that a small quantity of lime, or transparent lime-water, in which the lime can be only $\frac{1}{500}$th part of the whole, when added to cane-juice that has been duly cleared, renders it presently turbid with herbaceous matter now extricated, and thus facilitates the abstraction of this matter by subsidence. Thus also cane-juice which is a little wheyey or clouded, is broken to flocculence, by transparent lime-water, as well as by lime.

" I say the liquor is broken to flocculence, when the particles of herbaceous matter, seized by those of the lime, and coalescing, appear large and flocculent; and the liquor interceding them is seen quite transparent, when viewed by transmitted light, in the narrow part of a wine-glass.

" This breaking may also be distinguished in a bright silver spoonful of the liquor, by reflected light.

" On these grounds, some lime ought to be added to cane-juice which contains the ordinary quantity of herbaceous matter; not with the vain hope of separating all the herbaceous

matter at once; but with the experienced certainty, that the liquor yawed or cleansed with the aid of lime, will contain less herbaceous matter in solution than it would otherwise have retained, and will require the less additional lime to act on the molasses acid.

"Towards the kind of depuration which can be effected in the process of yawing, lime thus contributes something, but not nearly so much as has been generally supposed; for a quantity of lime which is sufficient to give a nauseous taste to the sugar, is yet incompetent to the extrication of all the herbaceous matter, so that it shall be separable by yawing or subsidence: and an excess of lime, not greater than $\frac{1}{2000}$ or $\frac{1}{3000}$ of the weight of the juice, is constantly attended with a manifest debasement of the colour of the sugar, when this excess takes place in the beginning of the boiling, or previous to the reduction of the juice by evaporation.

"It is of no practical use to inquire after every agency by which the excess of lime has these effects; but it is expedient to observe, that when a juice is yawed with excess of lime, and cleared to transparency by subsidence, which soon takes place in a specimen quickly cooled in a wine-glass, it will show colour approaching to that of porter; whilst the like juice, treated in the same way, but with only a moderate dose of temper, will be almost colourless when transparent.

"It is moreover to be observed in ordinary practice, that when too much temper has been used in the yawing, the liquor, during the boiling in the teaches, looks much browner than that which has been less tempered: the scum has a darker colour, and is more apt to break and sink into the liquor; and it has less of the tenacity and flocculence by which ordinary scum clings on the skimming instrument, and is separable by the common process.

"The practical inference from all these facts is, that the temper ought to be used sparingly in the raw juice in the operation of yawing; although it should be found necessary to use more temper afterwards, for purposes different from those lately recited.

"It is chiefly by reason of the agency of the temper on the molasses acid, or on that matter which most powerfully impedes the separation of the sugar from the molasses mother-liquor, that the temper is eminently useful in the manufacture of muscovado sugar, and that the greater quantities of it may be advantageously employed; provided the whole of it be not administered at once, and at the period of the manufacture in

which it is apt to colour the juice, to lessen the buoyancy and tenacity of the scum, and to frustrate the labour of the skimmer."

Then follow Dr. H.'s remarks on filtration through a wollen blanket or swanskin, with the mechanism and pressure necessary to aid that operation; and his observations on what he calls a "spraying instrument," to prevent the sugar from burning to the bottoms of the kettles. To these are subjoined the following chapter on the subserviency of the measures proposed, to the improvement of rum. (p. 111.)

"Concerning rum it is now to be observed, that it derives the depreciating characters of the recent spirit from two sources; the chief of which is the filth of the scums, and especially of the first scums in yawing.

"The tendency of such matter, even if they were nothing verminous or animalcular in it, is to the putrefactive fermentation, or rotting; whilst that of the sweets is to the vinous fermentation, and thence to the acetous. The product of the former fermentation is as offensive to the smell and taste, and as noxious, as that of the latter is grateful and cordial.

"Wherever scums are detained to await the spontaneous separation of the sweets from the filth, an intestine motion may be observed; and there chiefly, in the concurrence of these fermentations, the offensive product is generated. The rest is formed in the fermenting vats, in quantity proportionate to the filth of this kind which passes into them.

"Every vinous liquor capable of yielding an intoxicating spirit by distillation, affords some quantity of peculiar essential oil, which awaits the rise of the water of the latter and weaker runnings, and characterizes them: Therefore this essential oil is in a great measure separable from the spirit by re-distillation, especially if salts retentive of the water, and restraining the volatility of the oil, be used.

"But it is peculiar to the ordinary manufacture of rum, that a very offensive ethereal fluid is generated in these mixed fermentations; and that by reason of its volatility it is inseparable by re-distillation.

"But from the source above-mentioned, the essential oil of rum acquires extraordinary nauseousness; and as a single redistillation cannot exclude it totally, and as any number could not exclude the ethereal taint above-mentioned, the best new rum of any estate is that which runs intermediate, in respect to the offensive ether and the fœtid oily taints.

"All rum is improved by time in wooden casks, by exhala-

tion of ether and absorption of oil, and under a growing charge for waste, and for interest on the price, and some have improved it sooner by ventilation, but not without a great waste of the spirit. But now it may be remarkably improved immediately, by measures which prevent the described contamination: And the first of these is the abstraction of the putrefactive matter by filtration, and the immediate conveyance of the clear warm fragrant liquor to the working cistern, there to undergo the most timely and productive fermentation, and to suffer the least defalcation of spirit by foul scum and bottoms, which are generally thrown away.

"Another source of the contamination is in the empyreuma: But as this regards the distillation, as well as the errors in making sugar, it is unnecessary to say more of it at present than that the prescribed measures, together with a judicious setting and management of the still, will totally prevent the empyreumatic smell and taste."

Part II.

Full of his occupation, Dr. Higgins, in this part of his work, dwells upon the details of the processes described in the first part. He is very particular in his instructions for fixing and employing filtering machines to remove gross and feculent mixtures. Many practical cautions are added on the erection of furnaces, disposition of the coppers, and the economy of labour, &c. These instructions, which are of the greatest use to the cultivator, are not likely to be very instructive or amusing to our readers; first, because they are devised expressly for the plantations where sugar is cultivated; and, secondly, because there are almost constant references to the drawings annexed. We therefore pass them by.

Part III.

Herein there is a recapitulation of the principal directions contained in the *first* and *second* treatises. As the works were published at different times, and might be dispersed, neglected or lost, Dr. H. brings to mind, very fully and forcibly, the capital instructions which he had published before, with such additional directions as his subsequent experience and reflection had suggested to him. He has done this so completely, that, in fact, this last piece almost contains the sum and substance of the whole performances. Many faults in the first part are corrected in this. In page 50 he has some remarks on cement and mortar, which we copy for the use of our readers; these

remarks being applicable to every kind of bricklaying and masonry in all countries.

"As the cementing power of the mortar depends entirely on the lime, and as erroneous notions and practice in the preparation, keeping, and application of this article, have been productive of great mischiefs, we shall state the reasoning and the most useful advices, on these subjects, collectively, as follows:

"Every natural stone, whether hard or friable, or distinguished by the name of lime-stone, or marble, or chalk, if it yield good lime by burning, consists of about nine parts by weight of lime, or mere calcareous earth, and seven of carbonic acid.

"These principles are held coherent and combined in the native stone, by their reciprocal attractive forces: But by the attraction subsisting between each of them, and the matter of fire, by a law of nature, each of them is combinable with that matter, and actually unites with it in the high temperature of a lime-kiln.

"In this union, the carbonic acid, which was solid in the lime-stone, becomes a fluid invisible, expansive, permanently elastic, and soon dissipated in the common air: but the mere calcareous earth remains combined with a portion of the matter of fire only; of which a great part is discoverable, and even mensurable by modern instruments, when lime is slaking in water, or combining again with an acid. In the latitude of speech, however, we say lime-stone is converted to lime by the expulsion of the carbonic acid.

"If a composition be made of sand, water, and the finest powder of lime-stone, or of chalk, in the manner of mortar, it acquires no considerable solidity, or cementitious power in drying in time, or in exposure to the open air: And it is in consequence of the liberation of the lime from the carbonic acid of lime-stone, that the calcareous earth can act with its native unrestrained attractive and cementitious powers: All in conformity with a law of nature, which governs every kind of matter, even that of fire not excepted.

"As the fire is gradually administered and augmented in a lime-kiln, the carbonic acid is expelled in successive portions, from every stone; and it depends on the duration and intensity of the fire, whether one fourth, or three fourths, or the whole be expelled, and whether the product of the process be perfect lime, or a thing passing for lime, but really defective in regard to the cementing power, in proportion to the quantity of carbonic acid still retained.

" By divers experiments described in the Author's essay on calcareous cements, it has been conclusively proved, that either in a close vessel or in an open fire, the whole of the carbonic acid may be extricated, and perfect lime may be made in three or four hours, if the fire be sufficiently intense: But that as the fire employed is weaker, less of the carbonic acid is expelled, and the product of the process is less competent to the uses of lime, however long the lime-stone may have been exposed to such weaker heat. It follows, then, that lime prepared with a brisk fire of a competent quantity of fuel, is preferable to that on which a much greater quantity of fuel may have been consumed in slower and weaker combustion.

" It is accordingly the practice in some places in England to burn in kilns of peculiar construction, and with a well ventilated fire, for the best lime for tarras and mortar of sluices and water fences, and for exportation in casks. But the more common practice there, as well as here, is to burn more slowly, and with no more fuel than is necessary to make the lime saleable, by the criterion of slaking with water. For the manufacturer of lime for sale finds that this answers his purpose; and those who burn for their own use imitate the common manufacturer, or take worse methods, for want of kilns.

" But the slaking is not a true test of the transition to good lime. For although there are particular hard and fine-grained lime-stones, which do not acquire this property before the carbonic acid has been expelled to the quantity of about five sixths of the whole; all chalks, marbles, divers lime-stones, and the brittle and coarse-grained especially, will slake when a much smaller quantity of the acid has been expelled. He who prepares such lime for his own use, and merely to avoid the consumption of a little more fuel, pursues a false economy: For exclusive of its being defective of the cementing power of lime, it is wasteful; because the more of it must be used in making mortar, for which the mason's rule is to add lime until the mass has plasticity enough to stick to the trowel, and hang at the joints.

" The proper test of lime is that which shows whether any carbonic acid, or what quantity, is still retained: And the simplest and fittest for popular use is the following:

" Into a mixture of two tea-spoons-full of water, with one of spirit of salt, or common marine acid, a tea-spoon-full of the lime moistened with water, to expel the interstitial air, is to be quickly blended.

" If there be any quantity worth notice of carbonic acid, it

will be dislodged, and will issue forth in the form of an elastic fluid, not visible, but easily perceptible by the commotion, mantling, or effervescence which it will excite in the mixture.

" If there be no effervescence, the lime may be considered as completely burned. If by more of the acid the whole can be dissolved to liquor pretty clear, and showing little or no sediment, the lime may be considered as excellent for temper as well as for mortar. If the solution of non-effervescent lime shows a sediment fat and plastic like clay, it may, like Darking or Barrow Lime of England, be excellent for mortar, and especially for the tarras mortar of water fences; but it is yet to be inquired whether it be eligible as temper.

" In this probation by acid, the more the mixture effervesces, the worse is the lime for any of these uses.

" Where the marine acid cannot be had, strong vinegar, without any addition of water, excepting what moistens the lime, may be employed; but it does not serve so well as the former acid to detect small quantities of the carbonic acid; because there is no escape of the elastic fluid nor any effervescence, until the quantity liberated exceeds that which the water of the vinegar can retain.

" It is not to be inferred from these observations, that all the lime is defective, which is prepared by burning in the stratified field-pile; for when this is built very high, and is well stratified with a bulk of good wood, three or four times greater than that of the stone; when the combustion is quick, by reason of the free passage of air through the strata, and the wind is not strong enough to push the chief part of the flame to the leeward side; good lime may thus be obtained, with no great waste, by lime-core or stone imperfectly burned. But the consumption of wood, or the labour, is in this case enormous, in comparison with that which might serve in a kiln of judicious construction.

" It is not more necessary that lime should be sufficiently burned to serve by the smallest quantity for the best mortar, than that it should be preserved in this state, until it is applied to use. To this end it ought to be generally known, that it undergoes debasement and injury proportionate to the time and extent of its exposure to the atmosphere, from which it powerfully attracts moisture to slake it, and then re-absorbs carbonic acid, which the fluctuating air continually presents: And then it will be as generally believed, that in proportion to the quantity of acid thus resumed, the lime will gradually revert to what it was, at periods intermediate between the commencement

and the completion of the process by which the lime-stone had been reduced to lime, and that the lime which has been much exposed is, in its cementitious powers, much the same as that which has been imperfectly or but slightly burned.

" In the latitude of common speech it may be said, that whilst lime is kept dry, it takes no damage from the air. But it would be more correct to say, it takes no damage whilst it remains unslacked; and this reason might be added: The same fiery agent which separated the principles of lime-stone, and combined with them severally, continues to keep them apart, until a new medium, such as water, interposes to expel that agent, and give preponderancy to the attractive powers, subsisting between the mere earth and the condensed carbonic acid.

" By the affusion of measured quantities of water to lime in close vessels, we learn that the slaked lime may hold a great quantity of water, and yet feel perfectly dry to the touch. Whether this quantity be a sixth or more of the whole weight of the lime, we cannot now recollect. But it is certainly great enough to show that lime slaked by moisture from the air, however dry the powder may feel, has the means of concentrating and imbibing the carbonic acid wafted to it in the air.

" In fact, slacked lime kept in a dry airy room becomes effervescent, by the quantity of carbonic acid imbibed in the course of a few weeks: And mortar used in masonry increases in hardness and in the effervescent quality, for months, if not for years, after the whole has been dried so far as to feel dry.

" Natural lime-stone, and lime restored to that state by the resumption of carbonic acid, are insoluble in water, or nearly so. But lime dissolves in less than six hundred times its weight of water, to form the transparent fluid called lime-water. This, when exposed to the open air, shows how quickly the lime, by the intervention of water, can resume carbonic acid from the air: for the earthy crust which presently forms at the surface exposed to air, and no where else, consists of lime reduced to the state of the native substance of lime-stone, to be effervescent in acid, and insoluble in water; and, however often this crust be broken in, a new one is formed in the same way, until the water is left destitute of lime.

" From these premises it follows, that mortar which is most quickly made and used in masonry will be the strongest; and that it is absurd to make immense quantities of mortar, with the view of improving it by keeping, unless the air be at the same time precluded."

Having laboured thus far to meliorate and economize the manufacture of sugar, Dr. H. turns his attention (p. 157) to the improvement of rum. His object was to remove immediately, by chemical agency or superior management, that *hautgout* or *stinkabus* flavour which *new* rum almost always possessed in some degree, and which is usually removed only by age and keeping. His ideas may be perused in the following quotation. (p. 157.)

" In the fermentation of molasses and saccharine sweets, as well as in the like process for the production of ales and wines, from their respective fermentable subjects, the principal products are, 1. Alkohol; 2. Essential oil; 3. A saline oleaginous and earthy compound in the form of yeasty dregs; 4. Acetous acid, varying in quantity with the nature of the fermented subject, and with the circumstances of the fermentation; 5. Carbonic acid gas, which, in its escape, causes the commotion of the fermenting charge, and of which but little, comparatively, abides in the beverage; 6. Farina, or sweet, which has eluded this primary visible fermentation, and of which the quantity remaining unaltered is greater, as that of the concomitant alkohol is greater relatively to the water: for it is the nature of alkohol, in proportion to the quantity, to impede fermentations.

" By this agency of the spirit, and by the aid of pression in close vessels, and quiescence and coolness, each vinous beverage may be long preserved mellow and nutritious by the unaltered farina or sweet exhilirating by the alkohol, brisk by the detained carbonic acid, and all the while capable of that slow, invisible fermentation, in which the unaltered sweet or farina above-mentioned is gradually expended, in the formation of spirit and carbonic acid, to repair the waste of these by transpiration through the vessels or stopples. But when the purpose is speedily to obtain the greatest quantity of spirit, the fermentable subject is to be used in that smaller quantity, by which the most of it may be converted to spirit, and the least left unaltered; and the fermentation, and the expulsion of carbonic acid, are to be promoted by plunging, and by covers serving to retain the heat and the spirit, without compressing the charges.

" The essential oils evolved in the vinous fermentation, are as different in smell and taste as the fermentable subjects are different in kind or name. But in regard to the portions which accompany the water and spirits in distillation, they agree in the common character of rendering the spirits, and especially the

weaker runnings ungrateful, if not unwholesome: And excepting what may depend on ethereal impregnation hereafter to be noticed, we may say generally, that the difference between any two or more of the spirituous liquors which are objects of commerce, depends on their essential oils. For as the proportion of these is lessened by the art of the rectifier, or chemist, and by transpiration through wooden vessels, these spirituous liquors become mellowed and grateful, and approximate each other in medicinal and chemical character.

" In charges productive of the best wines, or vinous liquors, this fermentation has its distinct time and progress, anterior to the acetous: But in fermentable charges of different descriptions, such as those which yield the meagre or acerb beverages, and such as those commonly fermented for rum spirit, an acetous fermentation accompanies the vinous; or acetous acid is formed in the very time of the vinous fermentation; to the perversion of ingredients that are common to spirit and to vinegar, and to another injurious effect hereafter to be shown.

" In the fermented liquor from which rum spirit is to be distilled, as well as in divers others above mentioned, acetous acid may subsit in considerable quantity along with the spirit, without uniting with it to form ether. But in the heat and vapour of the distillation, it is the nature of this acid to convert a proportionate part of the spirit into acetous ether, which, by virtue of its extreme volatility, rises along with the first and strongest spirituous runnings, and gives them smell and taste extremely ungrateful to every uncorrupted palate. Hence the adage that rum becomes more fiery by repeated rectification, such as serves to improve the European spirits: And the reason of it is, that the rectified spirit is but a part of the still-charge, and yet contains the whole of the ether.

" The most judicious manufacturers of the more grateful spirituous liquors, take the greatest care to exclude from the fermentative charges every vegetable matter or filth, which is incapable of vinous fermentation, and is prone to the putrefactive: For they are well aware that the putrescent matter tends to make the vinous fermentation tardy and sluggish, and to give a taint which passes from the beverage to the distilled spirit. In like manner the manufacturer of spirit from the saccharine wash of the boiling-house, endeavours, by skimming and subsidence, to free the sweet from the putrescent herbaceous and filthy scums, previous to the setting for fermentation, and afterwards throughout the process. But as the depuration by these ordinary means is very far from being perfect, and as it is the

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nature of the saccharine juice itself to generate some acetous acid along with the spirit in the fermentation, the product from the fermented charge is of the vilest kind; for the spirit is not only charged with acetous ether and the essential oil peculiar to this sweet, but with the tainting and oily products of the putrescent filth.

"But as it is the nature of molasses to generate less acid relatively to the spirit in fermentation; and as much less of the putrescent matter above mentioned accompanies this sweet in the fermentable charges; especially when they are made without any wash from the boiling-house, and without any dunder or refuse of a former distillation; the spirituous product in distillation differs from that last mentioned, as much as it differs from malt spirit, and is highly preferable in smell and taste. It demands the name of *molasses spirit*, to distinguish it from the spirituous product of the ordinary mixtures of boiling-house wash and molasses, with or without dunder, to which the name *Rum* is to be confined.

"As the melioration of these, like all other spirituous liquors, by long keeping, depends on the escape of the offensive oily and ethereal parts, which sooner than the alkohol penetrate and pervade wooden vessels; our first advices for the improvement of the manufacture are to show how it is to be uniformly productive of the utmost quantity of spirit, divested of the nauseous and depreciating ingredients, so far at least as to be capable of acquiring, in a short time, the flavour and value of good old rum, with the least loss of spirit by transpiration; and to be highly preferable, even when recent from the still, to any new rum of the ordinary process."

To this account are added threescore practical sentences, very judicious, but too long for transcribing.

It was to be hoped that this employment of time and talent by Dr. H. in favour of his patrons, would have answered at least all their moderate and reasonable expectations. And we do not know that this is not the fact. But one thing we know, that the New-York market, which receives annually about three thousand puncheons of Jamaica rum and spirits, contains, *as yet*, no evidence of improvement in their quality. The wholesale grocers and spirit-dealers are not sensible of any improvement in the article which is brought there. They who have been long in the trade, declare that rum now comes to them just as it formerly used to do, in some years better and others worse, according as the season brings forward the crops; from some plantations good, and from adjoining ones

bad, in proportion to the pains taken in the preparation. The flavour is *piny*, *smoky* or *fiery*, as *tar* prevails in the cisterns, *empyreuma* happens in the stills, or *ether* is produced in either place; very much as was formerly the case. It is still found necessary to leave the stored puncheons three or four years with their bungs out, to give their contents the quality of "old Jamaica spirits." And this, when done, is always accompanied with a great lowering of the proof, and with loss, averaging, as some have reported, one per cent. a month by evaporation, independent of leakage. Hence the greater part is consumed before it acquires such a respectable and mellow age.

Though this account appears rather unfavourable to Dr. H.'s system of management in the preparation of sugar and rum, we entertain a confidence he will not be disappointed or discouraged, but that both these branches of manufacture will be ultimately improved by his skilful exertions.

ART. IV. *Practical Observations on Vaccination, or Inoculation for the Cow-Pock. By* John Redman Coxe, *M. D. Member of the American Philosophical Society, and one of the Physicians to the Pennsylvania Hospital.* 8vo. pp. 152. *Embellished with a coloured Engraving. Philadelphia.* J. Humphreys. 1802.

THE respectable author of this work is one of those who have taken laudable pains to introduce the inoculation of the cow-pock into the United States, to remove the difficulties which opposed its reception and progress, and to correct the mistatements which ignorance or a mischievous disposition have circulated in the community. He seems duly to appreciate the value of the discovery, and endeavours, with a zealous and benevolent warmth, to recommend this safe and easy substitute for the small-pox.

Most of the leading facts and principles concerning the cow-pock, known and ascertained at the time, are noticed in this publication. The author states the circumstances of the Jennerian discovery, and does full justice to the merit of that eminent benefactor of mankind. He seems to agree with Dr. Jenner in thinking that the infection of the cow-pock was originally derived from the *grease* in horses, and presents some of the more striking facts which have been adduced by different persons in support of that opinion. A history of the disease

follows in the next place, in which he first delivers the ordinary and regular concourse and succession of symptoms from the commencement to the termination of it, and afterwards such irregularities as are observed most frequently to occur.

Much discussion and difference of opinion have arisen on the question, how late in the disease it may be allowed to take matter for the purpose of inoculation? The author cannot entirely agree with the illustrious discoverer, who enjoins it upon inoculators to consider the appearance of the efflorescence as a sacred boundary which ought not to be transgressed. He is rather inclined to believe, that while the fluid in the vesicle continues limpid, and the scab is not too far advanced, no inconvenience will arise from the use of the matter. And, on the whole, as a general rule, he thinks it best to select a point of time, beyond which the matter is not ordinarily to be taken; this time he supposes may properly be eight times twenty-four hours.

It is important to consider the means of preserving and transmitting the matter of this disease, as it is so small in quantity, so delicate and perishable. Dr. C. mentions the various modes adopted for this purpose, but gives the preference to the preservation of the matter between two plates of glass.

After these discussions, Dr. C. proceeds to offer a summary view of the evidence in favour of the prophylactic powers of the cow-pock against the small-pox. But in this it would be unnecessary to follow him, as we are persuaded that none of our readers at the present day can doubt that body of testimony on this subject which has been long since and repeatedly laid before the public.

Dr. C. advises not to consider the vaccine as a preservation against the small-pox, before it has completed its action on the system, which, he believes, is seldom before the ninth or tenth day. He adduces several cases of the union of the two diseases, of the co-existence of measles and cow-pock, of cow-pock and scarlatina anginosa, and of small-pox, measles and hooping-cough. Hence he infers strong proof of the possibility of two different diseases existing in the system together; a conclusion which is adverse to the generally prevailing doctrine of the present day.

The *spurious disease*, which has so often injured the credit of the cow-pock with the undiscerning and uninformed, is in the next place traced to its sources, and described in such a manner as will always secure the attentive and wary practitioner from this source of deception. The author supposes

that cases of spurious small-pox occur in a manner analogous to those of cow-pock, and thereby produce the disappointments which physicians sometimes experience in the effects of inoculation. But besides the cases of imperfect or spurious small-pox, he states instances of a second attack of that disease where the first had been characterized by all the essential and unequivocal symptoms. However difficult it may be to explain such cases, they seem to rest on unexceptionable facts.

The effects of vaccination in amending weak constitutions, form a branch of is excellence, which Dr. C. does not omit to exhibit in an advantageous light. He particularly mentions its efficacy in correcting the scrophulous diathesis, in removing certain cutaneous diseases, hooping-cough, deafness, &c.

The comparative view of the vaccine and small-pox is drawn with striking and appropriate features. Truth, indeed, would have justified a more extensive comparison for the purpose of demonstrating the preference due to the former; but enough is said to show the vast superiority of the vaccine over variolous inoculation.

In an appendix the author includes various letters on the subject of the spurious cases of cow-pock, which occurred on its first introduction in New-York, Norfolk, and elsewhere. He also adds a set of tables and notes comprising the outlines of some of the first cases of the cow-pock, which came under his care. And he concludes with sundry remarks and observations on the disease, which occurred after the body of the work had been sent to the press.

We think Dr. C. has collected in this work, and exhibited in a judicious point of view, many of the most material facts concerning the disease in question; and that he deserves the praise of industry, and a well directed zeal in extending the knowledge and practice of one of the most memorable improvements which occurs in the history of the healing art.

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The *spurious disease*, which has so often injured the credit of the cow-pock with the undiscerning and uninformed, is in the next place traced to its sources, and described in such a manner as will always secure the attentive and wary practitioner from this source of deception. The author supposes

that cases of spurious small-pox occur in a manner analogous to those of cow-pock, and thereby produce the disappointments which physicians sometimes experience in the effects of inoculation. But besides the cases of imperfect or spurious small-pox, he states instances of a second attack of that disease where the first had been characterized by all the essential and unequivocal symptoms. However difficult it may be to explain such cases, they seem to rest on unexceptionable facts.

The effects of vaccination in amending weak constitutions, form a branch of is excellence, which Dr. C. does not omit to exhibit in an advantageous light. He particularly mentions its efficacy in correcting the scrophulous diathesis, in removing certain cutaneous diseases, hooping-cough, deafness, &c.

The comparative view of the vaccine and small-pox is drawn with striking and appropriate features. Truth, indeed, would have justified a more extensive comparison for the purpose of demonstrating the preference due to the former; but enough is said to show the vast superiority of the vaccine over variolous inoculation.

In an appendix the author includes various letters on the subject of the spurious cases of cow-pock, which occurred on its first introduction in New-York, Norfolk, and elsewhere. He also adds a set of tables and notes comprising the outlines of some of the first cases of the cow-pock, which came under his care. And he concludes with sundry remarks and observations on the disease, which occurred after the body of the work had been sent to the press.

We think Dr. C. has collected in this work, and exhibited in a judicious point of view, many of the most material facts concerning the disease in question; and that he deserves the praise of industry, and a well directed zeal in extending the knowledge and practice of one of the most memorable improvements which occurs in the history of the healing art.

MEDICAL & PHILOSOPHICAL NEWS.

DOMESTIC.

IMPROVEMENTS IN DISTILLING SPIRITUOUS LIQUORS, BY COL. ANDERSON AND MR. KRUFFT.

COLONEL Alexander Anderson's patent for an improved mode of distillation has been the subject of considerable discussion. The Committee of Ways and Means reported an account of it to the House of Representatives, on the 8th of March, 1802; and stated that the distillers could run off their spirits so much more rapidly in this mode than by the old one, that the revenue was evaded, and that to collect it, in case the excises were continued, there would be a necessity to ascertain not merely the *capacity of the still and its head*, but the quantity *actually distilled*.

William Miller, Esq. the Commissioner of the Revenue, collected the facts on this subject from the Supervisor of the district of Pennsylvania, and the Collector of the county of Lancaster, and submitted them to the Secretary of the Treasury, with the following, among other remarks: "I do not find any considerable improvement in the form of the still itself has been attempted. The head and parts connected therewith are materially changed, and the alterations are calculated to answer very valuable purposes to the distiller. By means of the half-globe, which is connected with the still-head, by a pipe of four inches diameter, the capacity of the still is evidently augmented about one third, for which the distiller presumes he is not chargeable with duty. By giving the steam room to ascend, the process may be greatly accelerated without the risque of boiling over and injuring the quality of the spirit.

"The immersion of the half-globe (or condenser as it is called) in the mashing tub, for the purpose of heating the wash, saves much time, as it would be impracticable to bring a still to boil, in the ordinary way, in less than half an hour.

"As there is no unusual waste of material, nor an increased consumption of fuel, distillers must be great gainers by the new mode, provided they are established in a plentiful country, or where they meet with few impediments in obtaining supplies of grain."

We observe also a method of distilling, advertised by Mr. Michael Krufft, of Morrisville, in Pennsylvania. It is stated that he can, without forcing the still, work off fifty charges in 24 hours; that the spirit will be equal in quality, and greater in quantity than that produced in the old stills; that the expense in labour and fuel will not exceed one fourth, and that in this new construction there is no possibility of driving off the head, by which accident unskilful persons have heretofore sustained considerable injury.

PROVISION FOR MARINE HOSPITALS, AND FOR THE RELIEF OF SICK AND DISABLED AMERICAN SEAMEN.

By an act of Congress, passed July 16, 1798, a tax of twenty cents per month was laid upon all seamen in the merchant service of the United States arriving from foreign ports, during the whole time of their employment on board since the last entry of the ship; also, a like sum of twenty cents a month was ordered to be collected from every seaman in the domestic coasting trade, for such times as the seamen were in service. And these sums are deducted by the masters or owners from the sailor's wages, and paid to the collectors of the impost at the several ports of entry, who account for the same, quarterly, at the treasury.

By a subsequent act, passed March 2, 1799, the seamen of the navy of the United States were subjected to a similar tax, and the Secretary of the Navy authorized to deduct twenty cents a month from the pay of the officers, seamen and marines, and account for the same at the treasury, as the collectors do.

From these three sources a fund for the relief of sick and disabled seamen is derived. The sum total of this fund, as far as returns had been made on Feb. 16, 1802, amounted, including the monies collected both in private and public service, to 154,583 dollars.

The ports where hospitals have been established, or temporary relief afforded to seamen, are—

1st. Boston, Newport, Norfolk, and Charleston (S. C.), where marine hospitals have been established wholly under the laws of Congress, solely supported by the seamen's fund, and destined peculiarly for their accommodation: that at Newport has been some time ago discontinued. At Gosport, near Norfolk, an hospital was purchased of the State of Virginia, out of the navy fund. And an appropriation out of the or-

dinary seamen's fund has been made for the erection of a marine hospital in Boston.

2. Baltimore, where the funds are altogether derived from the same source; but the management of the sick is under the direction of the city board of health.

3. New-York and Philadelphia, where seamen are received at the hospitals already established for internal and charitable purposes. At these places they receive the same medical and chirurgical aid as the other patients do, and the like nursing, food and attendance. For their board, &c. a fixed weekly sum is paid out of the marine fund.

4. Portland, New-London, Wilmington (N.C.), Newbern, Edenton, and, latterly, Newport and Alexandria, where there are no hospitals, but where temporary relief is provided in private boarding-houses.

5. Some provision has likewise been made at Savannah.

It was directed, in the first law on the subject, that the monies collected within any one district *should be expended within the same.* It was afterwards enacted, that (excepting the New-England States of New-Hampshire, Massachusetts, Rhode-Island and Connecticut) the money of the seamen's fund might be expended in the *States adjoining the States in which the same should have been collected.* And during the session 1801—2, the whole of the fund was *consolidated* and *generalized*, so that the surplus of the unexpended money, at any one port or place of collection, may now be appropriated for the relief of seamen at any other place where there is a deficiency. This last regulation was adopted principally on account of increased expenses beyond the amount of the fund heretofore collected in the hospitals of Newport, Norfolk and Charleston, and beyond the amount of the *navy fund*, which, in addition to the other, was applied to these three places exclusively.

On account of the increasing transportation of produce on the Mississippi, an additional number of American seamen and boatmen find a rendezvous at New-Orleans. Many of these, from the Ohio and the upper country, as well as from the Atlantic ports and the ocean, have died annually, in the most forlorn condition, at that place. These considerations induced the government, by a wise and humane provision, to adopt measures for the support of a hospital in that city for their relief, and to ask permission of the Spanish government to establish the same.

IMPROVEMENT IN NAVAL ECONOMY.

Some time last winter, means were adopted in the navy department for keeping the public ships free from nuisances, and in a sweet and wholesome condition, by means of alkalies. A fair opportunity offered of carrying this plan into operation, on board the frigates employed on the Mediterranean service. Dr. George Davis was charged with the making of proper experiments upon the efficacy of pearl-ash, barilla and lime, in the ship Chesapeake, in which he sailed. Since his arrival on the Barbary station, Mr. Davis has been directed to perform the duties of fleet surgeon until the existing disputes shall be reconciled. In this capacity he has persevered in the use of those purifying substances, with all the advantages that had been anticipated from their operation. A continuance of health has been the consequence of this cheap, easy and efficacious mode of keeping the interior of ships perfectly clean. (The particulars may be read in our vol. v. p. 455—8.)

FAILURE OF THE EXPEDITION TO LAKE SUPERIOR.

Travellers have related that there are vast beds of native copper, and copper ores of great value, on the south side of Lake Superior, within the territory of the United States. For the purpose of inquiring into the facts and circumstances of these valuable minerals, a resolution of the two Houses of Congress was passed on the 16th April, 1800, authorizing the President of the United States to employ an agent to collect all material information relative thereto, to inquire whether the Indian title was extinct, and ascertain on what terms the mines might be purchased for the government. The agent was instructed to accomplish his mission, and make report soon enough to be laid before Congress at their next session. The next session began on the 17th day of November ensuing, and ended on March 3d, 1801.

The President did appoint an agent, but his commission was not made out until September 24, 1800. And no report having been made to Congress during the prescribed time, the Attorney-General wrote to the agent, who had not yet set off, on the 30th March, 1801, that the President wished to suspend the prosecution of the business, and directed him not to proceed, but to make report of his arrangements, expense incurred, &c. and be ready to account for the sum of one thousand dollars advanced from the treasury for the mission.

Thus this voyage to the north-west fell through: yet, while it is admitted to be right to stay the commencement of expenditure of public money, after the resolution authoriz-

ing it had expired, yet it is a matter of regret, that, through delay and procrastination, so fair an opportunity was lost of exploring that frontier of the United States.

The history of these proceedings may be seen in a message of the President of the United States to the House of Representatives, dated March 31, 1802, sent pursuant to a resolution of the House on the 23d.

NEW AMERICAN METAL.

It is stated in several English publications, that Mr. Hatchett has discovered a new metal in an ore lately brought from North-America. This he has distinguished by the name of *Columbium*, significant of the country whence it was derived. We have no particular information from what spot or region the mineral was procured.

RATION OF AN AMERICAN SEAMAN.

The navy ration for the mariners on board the armed ships of the United States, was fixed by an act of Congress for providing for a naval armament, on July 1, 1797:—On Sunday, one pound of bread, one pound and an half of beef, and half a pint of rice: on Monday, one pound of bread, one pound of pork, half a pint of pease or beans, and four ounces of cheese: Tuesday, one pound of bread, one pound and a half of beef, and one pound of potatoes or turnips and pudding: Wednesday, one pound of bread, two ounces of butter, or, in lieu thereof, six ounces of molasses, four ounces of cheese, and half a pint of rice: Thursday, one pound of bread, one pound of pork, and half a pint of pease or beans: Friday, one pound of bread, one pound of salt fish, two ounces of butter or one gill of oil, and one pound of potatoes: Saturday, one pound of bread, one pound of pork, half a pint of pease or beans, and four ounces of cheese: and also an allowance of one half pint of distilled spirits per day, or, in lieu thereof, one quart of beer per day to each ration.

For the peace establishment, the ration was altered as follows, by a law passed March 3d, 1801:—Sunday, fourteen ounces of bread, one and a quarter pound of beef, half pound flour, quarter pound suet, half pint distilled spirits: Monday, fourteen ounces bread, one pound pork, half pint pease, half pint spirits: Tuesday, fourteen ounces bread, one pound beef, two ounces cheese, half pint spirits: Wednesday, fourteen ounces bread, one pound pork, half pint rice, half pint spirits: Thursday, the same as for Sunday: Friday, fourteen ounces bread, four ounces cheese, two ounces butter, half pint rice, half

pint molasses, and half pint spirits: Saturday, fourteen ounces bread, one pound pork, half pint pease, half pint vinegar, half pint spirits. (For the soldier's ration, see Med. Rep. vol. v. p. 90.)

PLATINA FROM THE MINES OF CHACO, IN TERRA FIRMA.

Three hundred pounds of platina were imported into New-York in October, 1802, from the Island of Jamaica. But it was not a native production of that place. It was brought from the continental dominions of Spain. As the exportation of platina is prohibited by the government, this quantity was smuggled off in small parcels. In the course of certain secret mercantile transactions, these different collections found their way from the Spaniards to a British subject, who brought to this market the above-mentioned quantity, which is but a part of what he had gathered together.

Such a quantity of the rarest of the metals, and of one which is believed to be peculiar to America, and known to Europe only about the middle of the eighteenth century, afforded an excellent opportunity of examining its condition when offered for sale as an article of commerce. Dr. Mitchill, to whom a sample was sent, and who was requested to look at it, described it thus:—This platina consisted principally of small grains, smooth to the touch, somewhat similar to flax-seed, and rather flat than round. The size of these grains was considerably larger than the coarse raspings of iron, and they were more irregular and varied in their shape. Some pieces, however, were much bigger, and there was one in particular of the size of a middling bean. The colour was midway between silver and iron; though the native metal, as it lay exposed to the eye, brought to mind a resemblance, though by no means an exact one, to filings of silver and powder of tin. The grains were less angular and shining than the former, and not so dark and globular as the latter. A portion of iron was mixed with the platina; for, on applying the magnet, numerous particles of a dusky hue adhered to it; and even many pieces of platina, known by their whitish complexion, were attracted by the load-stone. Pieces of galena, mingled with pyrites, were found mixed with it in the bags. There was also a mixture of earth and sand. The grains of platina were easily capable of extension between the anvil and hammer, and showed neither rust nor tarnish. There did not appear to be any quick-silver mixed with it.

Baron Carendeffez has subjected parcels of this platina to a

great many experiments, which he intends to publish at large. In the mean time it will gratify our scientific readers to learn, that he has found two hundred and eighty-eight grains of this platina to consist of the following parts:

Carbure of iron	56 *grs.*
Silicious or quartzy sand	12
Magnetical iron	40
Gold grains or dust	1
Pure platina	179

which is considerably more than one-third of foreign ingredients; and the whole of these, except the trifling portion of gold, of no value.

The mines in the Island of *Chaco* afforded it: These are in Terra Firma, about three hundred miles up the River Magdalena, and south-west some distance from Santa Fe, and are reckoned among the most pure and productive in America. The platina is found among the gold, and the grains of the two metals are washed from the sands together, and afterwards separated. All the platina, as well as all the gold, is deposited in the adjoining custom-house, and kept by the king's officers. It is not certainly known what becomes of the platina. For though it is reported that the policy of the government directs it to be thrown away, and committed to the currents of deep rivers, yet there is a belief that the whole quantity collected is transported to Spain. All commerce in platina is forbidden under penalty of death: consequently none can be procured but by smuggling, and at very great risk. The first cost, fees to assistants, and extraordinary hazards in this contraband trade, amounted to so much, that the owner of this parcel said it stood him in forty dollars a pound.

In respect to the proportion or quantity of the platina found, it is ascertained to be at least ten times as scarce as gold: that is, when the grains of one are separated from those of the other, there are only about from *eight* to *ten* ounces of platina for *one hundred* of gold. Hence, if ever the policy of nations should admit it among the precious metals for coining into money, platina would be ten times as valuable, weight for weight, as gold. In other words, a coined piece of platina, of the same weight with an eagle of the American mint, would be worth one hundred dollars.

MINERAL SPRING NEAR PASSAICK FALLS.

At Aquacanonk, in Essex county, East-Jersey, now called the township of Patterson, a mineral spring, called Blachly's

Bath, has, of late, attracted some share of public attention. It breaks out of the loamy or gravelly soil of a tract of country abounding in silicious sand-stone or free-stone, distant four miles and one half from Passaick Falls, two miles from Aquacanonk Church, nine miles from Newark, and about thirteen miles from the city of New-York.

The spring is believed to be a chalybeate, and deposits an ochreous sediment upon all bodies over which it flows. This ferruginous deposition is a brown oxyd of iron. The water is so charged with the particles of this metal, that it strikes a purple or dark colour with infusions of tea, galls, and other astringent substances. Its other chemical qualities are not, as yet, so fully known as could be wished, though it is supposed to abound with carbonic acid.

This mineral spring is very cold, and sensibly more so than another spring of common water which bursts out within the distance of a rod. It yields a quantity of water, equal, by estimation, to the filling a conduit of an inch in diameter, and has never been known to freeze.

It may be drunk in large draughts, without inducing oppression or inconvenience. Though freely and copiously swallowed, it does not overload the stomach, nor produce any of the symptoms of refrigeration. In some of those who begin to drink it, it has operated a few times as a gentle emetic. Upon others it has produced a moderate laxative operation. But its chief effect, and that by which it is more particularly distinguished, is as a diuretic. By the kidneys it passes off largely, and remarkably increases the discharge of urine. They who have tried its efficacy likewise relate, that the perspiration is promoted by it, and that there is a more free and easy outlet of the fluids destined to pass off through the pores of the skin. Under its influence, they remark that the appetite for food is generally much increased, that the pulses are raised, and that there is frequently a pleasant excitement or exhiliration.

They also state, that in inflammations of the eyes, in ringworms, and in various other eruptions of the skin, it has done important service, as well as in cases of gravel, rheumatism, and obstructions of the abdominal viscera and alimentary canal.

The probable elevation of the spring is sixty feet above the level of Passaick River. Its situation is an open plain, surrounded by a country very healthy, moderately elevated, and finely diversified by hills and dales.

RARE AND INSTRUCTIVE AMERICAN MAPS.

Many of the events of the revolutionary war are perpetuated on the maps published by the British commanders, for explaining their operations and campaigns to their government. Some others of much value were made out before the revolution. We offer the titles of several of the more uncommon ones which we have lately examined, and which are of great value to the American statesman, engineer and historian.

1. Evans's map of the middle Provinces, accompanied with an explanatory pamphlet. At present the particular value of this is derived from the Indian names and the names of old forts and stations which are preserved on it, illustrative of the settlements of the French on the frontiers, and of the contests with them and their allies.

2. A map of the city of New-York and its environs, dedicated to Sir Henry Moore, baronet. It was done by lieutenant B. Ratzer, of the king's 60th or royal American regiment, and published by Faden and Jeffreys, of London, in 1776. It is an handsome and correct piece of work, and affords an agreeable retrospect of the state of things in and around this great capital at that time. This map includes all the space on Long-Island, York-Island, and the Jersey shore, between the latitudes of Blackwell's Island and Bucking Island.

3. A sketch of the operations of his majesty's fleet and army under the command of vice-admiral the Right Honorable Lord Viscount Howe, and General Sir William Howe, K. B. in 1776. This map is two feet eight inches by two feet, and was published by J. F. W. Des Barres, Esq. of London, in 1777. From S. to N. it comprehends all the space from the south of Sandy-Hook to the entrance of the Highlands, N. of Haverstraw-Bay, and between E. and W. it includes the country from beyond Cow-Bay, on Long-Island, and Mamaroneck on the main, in New-York, to Brunswick, Amboy, Woodbridge, Rahway, &c. and the tracts west of South River and the upper streams of the Raritan, the Passaick and the Rampogh, in New-Jersey. On this are strongly delineated the landing of the British troops in 1776, and all the subsequent proceedings of the fleet and army which distinguished that memorable year.

4. A small but instructive map of Major Holland's was also published by Des Barres in 1779, containing a plan of Fort Montgomery, and Fort Clinton, taken by his majesty's forces under the command of Major-General Sir Henry Clinton, K. B. This contains a view of Coplop's Kill, and the two forts on its

sides, opposite to the mountain called St. Anthony's Nose in the Highlands, with a sketch of the Hudson from St. Anthony's Nose towards Robinson's landing.

5. That part of Hudson's river which shows the positions of Fort Montgomery and Fort Clinton, with the cheveux de frize, cables, chains, &c. to obstruct the passage of his majesty's forces up the river, was delineated by Lieutenant John Knight, of the Royal Navy, in 1777, and published in connection with the preceding map also by Des Barres. This includes the whole tract of the Hudson's passage through the mountains, from *Peekskill* to *Newburgh*, with the depths of water all along from St. Anthony's Nose to Polipus (Pollepels') Island.

6. The maps accompanying General Burgoyne's vindication of his conduct, published in England after the convention of Saratoga, are very instructive, and highly worthy of perusal. Some of the best of these, particularly that of the route across the Lakes, were done, as we have learned, by Simon Metcalfe. And we mention this to give them greater credit, as being the result of actual survey by a skilful hand.

7. An handsome little map was published by Jeffreys, in 1760, of the city of Quebec, and its environs, as it surrendered to the British fleet and army on the 18th September, 1759, to Vice-Admiral Saunders and Brigadier-General Townshend. This gives a clear prospect of the condition of things in that eventful quarter at that time.

With these maps before him, the reader of American history can examine the local circumstances of the principal military and revolutionary events that have passed between Sandy-Hook and the capital of Lower Canada.

8. Henry Mouzon and others published a very large map of North and South Carolinas, from actual survey, in 1775. It was printed by Sayer and Bennett, London. Its length is four feet nine inches, and its breadth three feet four inches. On it may be seen the mountains, rivers, swamps, marshes, bays, creeks, harbours, and banks and soundings on the coasts, with the roads and Indian paths, as well as the boundaries of provincial lines, townships and other divisions of the land in both the Provinces, as they existed or were understood at that time.

FOSSIL SHELLS OF LONG-ISLAND.

In digging down the bank of the Navy Yard at the Wallabout, a stratum of marine shells has been found about twenty-five feet below the level of the soil. Among them was found a petrified oyster in fine preservation. This discovery corres-

ponds with the fact observed by the persons who dug the uncommon deep well on Brooklyn heights, within the fort erected there by the British, towards the close of the revolutionary war. Shells were found in digging this well, which were probably from this very stratum, extending from the adjacent Navy Yard. At Newtown shells have also been found at considerable distances below the surface, by the diggers of wells; and the like has been repeatedly observed on that island, especially toward its western end.

It is a remarkable fact that though the rocks in the maritime parts of the State of New-York are granitical and magnesian, and belong to the ancient order of things, and are part of the primitive class of terrestrial substances, yet the sandy, loamy, and gravelly strata are all horizontally disposed, and have the strongest evidence of having been superinduced in the course of ages by water. Every place which has been undermined by the ocean, or in the progress of improvement dug down by the hand of man, shows a stratification almost as regular as a level could make it, and the frequent occurrence of these animal relicks renders the matter independent of conjecture.

REMARKABLE ANTISEPTIC POWER OF CARBONATE OF SODA.

Muriate of soda is the common material employed for keeping off putrefaction from animal substances, particularly such as are intended for human food. The reason of this was stated in our vol. ii. p. 279. Carbonate of soda is still more powerful in antiseptic virtue. Twelve months ago Dr. Mitchill salted a piece of lean beef with powdered and undissolved carbonate of soda; from that time it has lain undisturbed in a wooden box, sustaining the heat of intervening summer. It has become very dry, has shrunk and lost much of its weight, and is at the same time so firm that its strong and adhering fibres require to be separated from each other by stout pulling. Not the least sign of taint or corruption has been discernible from the beginning, and it now looks as if it would keep for a century. It resembles almost exactly the flesh preserved by Dean Hamilton in pot-ash, as related in our vol. i. p. 179; and it corroborates the evidence given in favour of its antiseptic virtue by the ancients, as stated in our vol. iv. p. 96. To all which passages we invite the attention of our readers.

MEDICAL GRADUATION AT DARTMOUTH COLLEGE, (N. H.)

The degree of bachelor of Medicine was conferred on three candidates at the commencement held on July 21, 1802. These,

with the dissertations read and defended by them, are as follow, to wit:

Daniel Osgood,	On Consumption,
Cyrus Perkins,	On Fever, and
Jonathan H. Sparhawk,	On Hemorrhagy.

MURIATE AND SULPHATE OF SODA MANUFACTURED IN MASSACHUSETTS.

At Dennis, in the county of Barnstable, common salt is crystallized from ocean water, without culinary heat or boiling, in considerable quantity. The amount is stated at twenty thousand bushels a year of domestic sea salt. This is estimated at one-fifth of the quantity consumed in the Cape Cod fishery, annually, which is reckoned to be one hundred thousand bushels. It is stated to be excellent in purity, whiteness and weight. It resembles the first quality of Isle of May salt, and is as heavy as eighty pounds the bushel. Great improvements have been made in cheapening the erection of the works and in abridging the performance of labour. At the same place Glauber's salt is prepared in large quantities, to the amount it is believed of fifty tons per annum. It may be made there equal to any in the world, and abundant enough for the whole home market and the West-India Islands.

It is expected that both epsom salt and magnesia will be prepared from the bittern, as soon as the manufacture is a little further advanced, and the artists shall have had further time to gain practical skill by experience.

Observations on the new Planet, discovered by Mr. Olbers, of Bremen; and of the Opposition of Ceres, the Planet discovered before by Mr. Piazzi.

A conjecture as easy to make as useless to the progress of astronomy, had raised a presumption that a planet existed in the wide space between Mars and Jupiter; but the law which had been imagined to prevail being founded upon the relative distances of the planets hitherto known, no sooner seemed to be verified by the discovery of Mr. Piazzi's planet, than it was contradicted in the most formal manner, by the discovery of a second new planet, very near to the first. This is an instance of the overturning of opinions, grounded merely upon deceitful analogies, and on the false ideas we entertain of what ought to be denominated regularity and order in the designs of nature.

The new star, to which we allude, presents a very singular spectacle, entirely contradictory of the systems that had been

conceived to explain the formation of the planets, by virtue of a cause which seemed to have confined their orbits to the narrow zone called the Zodiac. The great inclination of this planet's orbit obliges us to enlarge considerably the width of the Zodiac, and gives us reason to believe that there may possibly be no limits to it. These reflections are deduced from the following facts, established by Mr. Delambre.

On the 20th Germinal, Mr. Burckhardt having been informed that Mr. Olbers, of Bremen, had discovered a new star which had the appearance of a planet, he communicated it the same evening to all the Astronomers of the National Institute of Paris, who looked for the star the night following. The next day Mr. Messier, Mr. Mechain, and Mr. Delambre, reported an account of their observations. The new star had a very perceptible motion, as well in right ascension as in declination. It had no appearance of a tail, nor even of nebulosity; nor was there any thing but its motion to distinguish it from the stars of the *eighth* magnitude, in whose neighbourhood it was visible. The observations on it have been continued at the meridian until near the end of Floreal. It always presented the same appearances, except that its light was more faint toward the latter part of her time, on account of its receding from the earth.

Unsuccessful efforts have been made to find a parabola which coincides with the observations. The circle has not suited at all better. It must be an ellipsis, and indeed a very eccentric one. In this respect the new planet does not differ much from Mercury; but what is more extraordinary is that its inclination is about 35 deg. while that of Mercury is only 7, and that of the planet *Ceres*, discovered in 1801, by Mr. Piazzi, is 10 deg. 37 min. On this account the *Zodiac* must be considerably enlarged, if we continue to distinguish by that name the zone in the heavens, in which *all* the planets perform their revolutions.

Another very remarkable peculiarity is that the mean distance of this planet differs very little from that of Ceres. There is no instance known in the Solar System, of two planets whose orbits approach each other so nearly.

So many singular phenomena render this planet uncommonly interesting to Astronomers. It is, however, so small that it can have no sensible influence on the neighbouring planets. On the contrary, it may be presumed, that it suffers very considerable perturbations from Jupiter. Mr. Burckhardt has kept an account of the principal ones, for the sake of determining an elliptical orbit. Indeed we have great need of a

tolerably exact theory, in order to find this planet again after it shall emerge from the solar rays, in which it is about to be plunged. Without such a theory, it would be hard to find it on account of its extreme littleness. It is very probable that it would have remained a much longer time unknown, if it had not been discovered precisely in the place which had been left by Ceres, and exactly among the stars which the Astronomers had observed, with so much exactness, for several months past. It is a curious reunion that has happened to the three planets, by which Astronomy has been enriched in our days, that they have all been seen to pass the meridian within a few minutes of time. Mr. Olbers has given to his planet the name of *Pallas.*

The perfection of instruments and of modes of observation have enabled the Astronomers of our day to determine from a few observations, the outlines of the planetary orbits, which formerly they were obliged to leave for future ages to settle. No sooner was one of these planets discovered than its motion was calculated with remarkable precision. By this, the opposition of *Ceres* (Mr. Piazzi's planet) has been proved, from observations made at the Military School by La Lande, his nephew, and Bruckhardt.

The time of its opposition was the 26th Ventose, tenth year (March 17th, 1802), at 3 hrs. 46 min. and 8 sec. mean time of the observatory at Paris. The true longitude, free from the effects of aberration, nutation and parallax, was 176 deg. 21 min. 26 sec. 5. The Geocentric latitude, north 17 deg. 7 min. 57 sec. 5. (Lacroix. Notice des Travaux, &c.)

Mr. Herschell purposes to distinguish these celestial bodies for the present, by the term " Asteroids."

Guyton's Rejection of Nitrous Fumigation to destroy the Infection of Air and Contagion; and his Recommendation of oxygenated Muriatic Acid Gas instead of it. (Uter horum pejor?)

It is curious to trace the vagaries of science. Upon one of the plainest and commonest processes, to wit, that of rendering nasty bodies neat and clean, there has been an uncommon parade of chemical conjecture and experiment, and the more philosophical and learned the projectors are, the wider they seem to wander from the mark. Every chamber-maid and washer-woman knows how to destroy infection and its poison by soap-suds, alkaline ley, and lime-water; but it is reserved for great geniuses alone to effect the destruction of them by

smoking with acid vapours. It is a great pity that in these matters philosophy is wholly at variance with the common experience of mankind.

In the month of June, 1802, R. HALL, M. D. translated from the French Mr. GUYTON MORVEAUX's *Treatise on the Means of purifying infected Air, of preventing Contagion, and arresting its Progress.* It was published by T. Hurst, in London, in a small 8vo. volume of 248 pages. His mode consists in employing muriatic acid gas, according to the following receipt, which will render every individual capable of performing the process of fumigation, (p. 240.) "No other apparatus is necessary except a bottle of sulphuric acid (oil of vitriol of commerce), a large glass goblet, and some common salt. The goblet being placed on the ground, or on a table in the middle of the room, a large spoonful of the salt must be put into it, and a very small *liqueur* glass-full of the acid should be added at three or four different times, with an interval between each time. At every effusion of the acid there will be disengaged and diffused throughout the apartment a quantity of vapour, which will come into contact with the fetid or malignant miasmata without producing any inconvenience to the persons present. When a chamber is to be purified in which a patient has died of a disease supposed to be contagious, or in which bodies in a state of complete putrefaction have been suffered to remain for some time, it will be necessary to double, or even to triple the quantity of the fumigating materials, according to the size of the apartment, to pour the acid in at once, and having retired, not to re-enter the room for some hours." He recommends *acetic* acid, or radical vinegar, as preferable to common vinegar or *acetous* acid, when vinegar is employed; though he thinks it not expensive or active enough for use in the large way, (p. 131, 133). And he proposes a method of making what he calls *extemporaneous oxygenated muriatic* acid, by pouring nitro-muriatic acid, or *aqua regia*, upon the black oxyd of manganese in gross powder (p. 123.), or by mixing with any portion of manganese double its weight of common salt, and then pouring upon them nitric acid or even aqua fortis. (p. 241.)

The most powerful and efficacious anti-contagious agent which he knows, is *the oxygenated muriatic acid gas.* The process for preparing this differs from the ordinary muriatic acid gas already mentioned, only by the addition of a small quantity of black oxyd of manganese (p. 242.) in powder.

The work is divided into *four* parts. Of these the *first* con-

tains Mr. Guyton's original experiments at Dijon. For an account of which, and for strictures and comments thereon, showing the mistakes in the inferences he drew, we refer to our vol. ii. p. 229, 240. In the *second* he has summed up the experiments made in foreign parts, that is, out of France, with acid fumigations. Among these are included the trials by Dr. Smyth, Mr. Menzies, and others, of which we gave an abstract and critical examination, evincing their inconclusiveness and fallacy, in our vol. ii. p. 232, 233, and in vol. iii. p. 200, 202. The *third* part contains the experiments of Mr. G. and his reasonings on them, concerning the qualities of air confined with pieces of raw beef left to putrefy in it under large receivers. These experiments are only *eleven* in number, and are by no means decisive of any great point on the subject. The celebrated author had originally assumed, "that ammoniac was the vehicle of the fetid miasma" in the church at Dijon; in his experiments (p. 78 and 98) he sought for ammoniacal gas among the products from his putrid beef, *without success;* and thence concludes that it exists in a saponaceous form, and that pure ammoniac, or carbonate of ammoniac (the contagious principle) "is carried into the air in a state of combination anterior to its solution in that fluid, which sufficiently indicates the necessity of turning our attention towards such agents as may be capable of destroying the affinities of this compostion." (p. 99.) He observes, further, that putrefaction is a disoxygenating process; and therefore the true corrective of air vitiated by corruption, is to decompose and neutralize ammoniac while it furnishes oxygen.

Holding this hypothesis invariably in his eye, he exposed air that had been confined with putrid flesh, and grown very fetid, to the action of *benzoin*, *balsam of Peru*, *storax* and *myrrh dissolved in alkohol*, and found, what every body would have supposed, that the putrid smell was not overcome. (p. 104.) *Vinegar of the four thieves* modified the putrid smell, but did not destroy it. *Pyroligneous acid* produced a great change at the putrid odour; such an one as all the American country maids have been acquainted with from their infancy of destroying bad smells in every thing about house, by holding them in the smoke. (p. 105.) *Gun-powder* would not *correct* putrid air. (107.) *Vinegar* destroyed the putrid smell. (108, 110.) Strong *sulphureous* acid did not wholly extinguish the putrid scent, though the *sulphuric* did. (p. 112.)

Mr. Guyton gives little comfort to the friends of *nitrous* fumigations, though he admits it to destroy the miasmata. He

thinks it almost incredible that Dr. Smyth's process, as affirmed by Mr. Keir, should afford *white* vapours, when he could get only *red* ones. (p. 115.) Putrid odour is sometimes perceptible after the application of nitrous vapour. (p. 116.) And the nitrous vapours, universally, instead of giving oxygen to the atmosphere, abstract it. (p. 118.) He even talks of *danger* from them. (p. 143.)

After all these follow the experiments on the oxygenated muriatic acid, which he declares to destroy putrid taints and smells altogether. Morveaux, Vicq-d'Azyr, and Chaptal, all dissuade perfumes and aromatic odours, as affording deceitful security.

After reciting his experiments and observations in favour of the oxygenated muriatic acid, Mr. Guyton has a chapter upon *oxygen*, and another upon *oxygenating* processes and agents. In these he concludes that he has established, beyond the possibility of doubt, "that oxygen, and the substances capable of being used as the vehicles for that principle, in a state favourable to new combinations, really excites the action of life, augments the heat, re-invigorates the powers, awakens the sensibility of the organs, and thus imparts to all the movements, that regularity which preserves order in the different functions of the animal economy." Hence the constitution put in such a state, by this anti-contagious or preservative remedy, counteracts the threatened activity of morbific matter. (p. 191.)

And he concludes with recommending this grand instrument of disinfection, to destroy the virus of plague, and all other contagions. (p. 220, 222.)

Here we behold a contention between the votaries of science, which destroys contagion more completely, "nitrous vapour," or "oxygenated muriatic acid vapour?" Dr. Smyth is positive he is right; and Mr. Guyton is no less certain of the correctness of his own conclusion. For our own parts, we think neither the one nor the other of the projects is positively good or worthy of imitation. At best, they are improper modes of purification, and the question which arises will simply be, not which of the two is the most beneficial, but whether the one or the other does the least injury. The muriatic vapour would seem to do less mischief than the nitrous; though bleachers and experimenters complain much of the inconvenience they suffer from breathing even it.

When will the philosophical gentlemen be convinced that the experience of five hundred years in the genteel house-keeping and domestic economy of Europe, has satisfied all persons

but themselves, that watery solutions of pot-ash, soda, soap and lime, have, when seasonably and duly applied, never failed to extinguish nastiness, infection and contagion? What need is there of all this apparatus, and of all these books and processes, when the best of possible methods is in daily use already, and only wants to be enlarged upon, and carried vigorously into execution?

PLAN OF THE LECTURES IN THE ROYAL INSTITUTION OF GREAT-BRITAIN.

The colleges and universities having been found to be almost wholly deficient in teaching certain of the most useful of the arts and sciences, a new establishment has been formed, by voluntary subscription, for diffusing necessary and practical knowledge in the various departments of physics. Of this establishment we gave an account in our vol. iii. p. 78. While this new institution is going on with great spirit and vigour, the colleges and universities are scarcely more advanced than they were two or three centuries ago, or when they were founded.

From a "Syllabus of the Course of Lectures on Chemistry," which we have seen, dated January, 1802, we shall give an abstract of what is doing in that royal institution. The lecturer "first" treats of *ponderable* substances. After some discussions on the general logic of science, on the nature of chemistry, on the corpuscular theory, on the powers of repulsion and attraction, on chemical operations and the instruments of experiment, he proceeds to the classification of his objects. He says the *simple* principles at present acknowledged are *forty-two* in number. These are divided into six classes. I. *Permanent gases, possessed of no acid properties.* 1. Oxygen gas. 2. Hydrogen (phlogistous) gas. 3. Nitrogen (septous) gas.—II. *Solid inflammable bodies, having no metallic properties.* 4. Phosphorus. 5. Sulphur. 6. Carbon.—III. *Metals.* 7. Platina. 8. Gold. 9. Silver. 10. Mercury. 11. Copper. 12. Tin. 13. Lead. 14. Iron. 15. Zinc. 16. Antimony. 17. Bismuth. 18. Arsenic. 19. Cobalt. 20. Nickel. 21. Manganese. 22. Tungstein. 23. Ceranium. 24. Molybdœna. 25. Titanium. 26. Tellurium. 27. Chrome.—IV. *Earths.* 28. Silex. 29. Alumine. 30. Zirune. 31. Glucine; to which some have added, 32. *Agustine*, and, 33. *Ittria.*—V. *Fixed alkaline substances.* 34. Pot-ash. 35. Soda. 36. Strontian. 37. Barytes. 38. Lime. 39. Magnesia.—VI. *Undecomposed acids.* 40. Muriatic. 41. Fluoric. 42. Boracic.

These simple bodies are arranged into *binary* compounds in this manner: BINARY COMPOUNDS containing, I. *Oxygen;* forming water with hydrogen; nitric acid, nitrous gas, and nitrous oxyd, with azote; phosphoric and phosphorous acids with phosphorus; sulphuric and sulphureous acids with brimstone; gaseous oxyd of carbon and cabonic acid with charcoal; arsenious and arseniac acids with arsenic; tungstic acid with tungstein; molybdic oxyd and acid with molybdœna; chromic oxyd and acid with chrome; various oxyds with different other metals; and *oxygenated* muriatic acid with that acid. II. Containing *Hydrogen;* such as ammoniac; sulphurated hydrogen and phosphorated hydrogen. III. Containing *Sulphur;* such as metallic ores and sulphurets; hepars, or alkaline sulphures; and sulphurets of phosphorus. IV. Containing the *Metals;* as metallic phosphurets; metallic carburets; binary alloys and amalgams. V. Containing the *Earths;* as of the earths with each other; of the earths with alkalies; and with the simple acids. VI. Containing the *Undecomposable Acids;* such as the compound salts, called the muriates, fluates, and borates, formed by the union of these acids respectively with alkaline salts and earths.

The simple bodies are combined into *ternary, quaternary,* &c. compounds. These the lecturer arranges thus:—I. *Oxyds with bases consisting chiefly of phlogiston and carbon;* such as the light and heavy hydrocarbonates; alkohol; ether; oils fixed and volatile; sugar; resin; wax; gum; tannin, or the tanning principle; the extractive, woody and colouring matters of vegetables. II. *Acids composed chiefly of hydrogen, oxygen and carbon:* such as the acetous, acetic, tartareous, oxalic, citric, malic, gallic, succinic, benzoic, camphoric, suberic, and mucous or saccholactic acids. III. *Oxyds with bases compounded chiefly of septon, phlogiston and carbon;* these are called gelatine, albumin, fibrine, urea and gluten. IV. *Acids composed chiefly of oxygen, septon, phlogiston and carbon;* such as the formic, bombic, laccic, sebacic, uric, prussic, zoonic and lactic acids. V. *Compounds containing earths and alkalies, or metals;* such as the ternary and quaternary alloys of metals; of earths with each other; and of alkalies with earths, in triple and quadruple combinations.

The compound substances made up of these various associations of simple substances, are classed by the lecturer under the following heads:—I. *Saline compounds;* including those

which contain acids, as all the numerous bodies of neutral salts; those which contain alkalies, as all the soaps; and those which contain oxyds, as the ammoniurets of silver, gold, mercury and copper. II. *Mineral substances;* including the ores and stones, &c. III. *Vegetable substances;* the solid and fluid parts of plants. IV. *Animal substances;* the muscular, fatty, soft, cartilaginous, membranous and bony parts of the animal solids; and the fluid parts, formed of blood, bile, milk, gastric and pancreatic juice, saliva, &c.

All these phenomena the lecturer states to be brought about by chemical action manifesting itself in four ways. 1. By simple combination. 2. By compound combination. 3. By simple decomposition. 4. By complex decomposition. Or, 5. By crystallization.

Then he proceeds to treat, in his "second" part, of *imponderable* substances. These, according to him, are HEAT, LIGHT, ELECTRICITY and GALVANISM. Upon each of these he dilates at considerable length, embracing the leading facts and theories concerning each of those copious and powerful agents.

The lecturer afterwards applies the principles of chemistry to explain and elucidate the arts; and treats successively of agriculture, tanning, bleaching, dying, metallurgy, manufacture of glass and porcelain, preparation of food and drink, and the management of *artificial* heat and light.

The reader will observe that his two great divisions of the objects of chemistry into the *ponderable* and *imponderable*, compels the lecturer to put the doctrines of heat, light, &c. into the rear. This appears very much like an *usteron proteron* arrangement. By throwing the leading, extensive and fundamental history of *caloric* into the latter part of his course, there can scarcely be a doubt of his having made an innovation, not only useless, but prejudicial to those whom he is to instruct. And many of the facts concerning light are so interwoven with those which relate to heat, that they ought, for the same reason, to have a priority in a course of chemical lectures.

For any thing we can imagine to the contrary, he might as well have divided the subjects into *visible* and *invisible*, or into *fusible* and *infusible*, *inflammable* and *uninflammable*, &c. as into "ponderable and imponderable." The distinction is not happy, nor calculated to do any good whatever to science. On the other hand, it seems likely to puzzle and confound.

Doubt whether the Opinion that Vegetables secrete Oxygenous Air during their Exposure to the Rays of the Sun is well founded.

A series of bold and well-devised experiments has lately been published, in London, by Dr. Woodhouse, who has just returned from a voyage to Europe, on the changes wrought upon atmospherical air by the germination of seeds and by the growth of plants. From these he contends that they do not purify atmospherical air; but whenever they appear to afford oxygenous gas, it is by devouring the coal of carbonic acid gas for food, and leaving its oxygen in the form of pure air. He also has made experiments on the effects produced by the leaves of plants in common air, impregnated with carbonic acid gas, and exposed to solar light; in which cases the carbonic acid disappeared, and the oxygenous gas increased. And from trials made with the fresh leaves of many different plants, exposed to sunshine in pump-water, Schuylkill water, and this latter charged with carbonic acid, he is confirmed in the same conclusion. Dr. Woodhouse denies that vegetables either decompose water, emit oxygen, or absorb azote, as has been some time the fashion to believe. (See Nicholson's Journal.)

NOTICES RESPECTING THE CITY OF HAVANNA.

The Editors being desirous to obtain a summary account of the city of Havanna, in the Island of Cuba, especially of its population, climate, hospitals, &c. have been politely favoured with the following interesting details, by JOHN MORTON, *Esq. late Consul of the United States at that port.*

The city of Havanna is in the latitude of 23 deg. 12 min. N. and longitude 82 deg. 13 min. W. of London. It is the capital of the Island of Cuba, which is from 700 to 800 miles long, and, on an average, about 75 miles broad. The city is situated on a level point of land; is surrounded, on the land and sea-board, by an high wall and ramparts, mounted with cannon; the sea close upon its walls on the western, and the harbour, in the form of an elbow, surrounding it on its northern and eastern parts; there being but three gates or outlets on the land-side, and a small portion of the harbour appropriated to a quay for the lading and unlading of vessels. The north and north-eastern (opposite) sides of the harbour, which is narrow, not admitting more than one vessel to enter at a time, are skirted by the heights of the Morro-Castle, and

the fortifications of the Cavanas, which intercept the course of the sea-breezes, in a great degree, to the parts of the city bordering on the shore.

The streets of Havanna intersect each other at right angles; are narrow, and, it being an exposed garrison town, are mostly unpaved. The houses are generally of two stories height; built of very thick walls, from large quarries of a kind of free-stone which are in the neighbourhood of the city; plastered over both within and without; the apartments large and convenient, with very high ceilings, and flat tiled roofs.

The police of the city, as it respects its cleanliness, is very imperfect; much filth being suffered to collect in the streets, squares, and yards of private dwellings, causing, particularly during the periodical rains, very offensive putrid exhalations. The city is supplied with water, conducted by a canal, from a river at the distance of four or five miles, and which is distributed in the city from fountains erected in the principal squares; but the water most commonly *drank* is rain-water, collected in large cisterns, and which, in dry seasons, becomes, of course, unwholesome.

The average degree of summer heat on low grounds, those of the Havanna, for instance, is from 80 to 84 degrees. It very seldom rises higher than 86 or 88 degrees.

The winter degrees (for there is very little of autumnal and vernal seasons) are from 65 to 70. I never knew the mercury to fall below 45. The hot months may be reckoned from the 1st of *April* to the 1st of *December;* the remaining months being properly termed temperate: but the seasons, as on our continent, have, in that respect, of late years, considerably varied.

The epidemical disease (the fever of the climate, commonly called the yellow fever) is confined almost entirely to the towns on the sea-board. It generally begins to prevail with most violence about the beginning of July, and continues throughout November. As in all warm climates, it affects strangers mostly; but, during the past season, it existed also greatly among the natives. It is certainly increased in time of war, from the additional number of strangers, sea and land forces; but of its *locality*, I never, during a three years' residence, had a *shadow* of a doubt. If I had had any at first, they would have been dissipated by a thousand convincing proofs which occurred. It never was denied, in my conversations with the intelligent and liberal minded natives. They invariably spoke of the disease as we do of the small-

pox, measles, &c. as one with which they must naturally be infected at least *once in their lives*. The celebrated XIMENES (known throughout Spanish America), when he attended me at the Havanna, in the summer of 1800, told me I was attacked by the fever *of the country*, termed the *yellow* fever; and, in repeated conversations, clearly and distinctly explained it as *originating* in the country, and not from any *foreign*, but from positive *local* causes. On my last return to the Havanna, he had set out on travels through Spanish America, by command, and in the employ of his majesty, to make useful discoveries in that region; I should otherwise have obtained from him a statement, in writing, of his opinions, and of facts which he had collected and established. I still hope, however, to procure them. The paucity of other scientific characters in that quarter is too generally known to be here further asserted.

The ravages which the yellow fever particularly made, of late years, among the American seamen and other visitants at the Havanna, were occasioned by their fatiguing labours under the continual heat—the unfavourable situation of the *harbour* for coolness—their exposing themselves, after such heating, to the night air and dews—and to their intemperate living.

In those warm latitudes, the sea breeze, or *trade wind*, sets in every day about 10 o'clock A. M. continuing till near sunset; when the land breeze as invariably commences, and, continuing till about seven in the morning, renders the night cool: hence the hottest part of the twenty-four hours is during the cessation of both winds, from seven to ten in the forenoon.

The rainy season commences generally about the middle of May, in the upland country, over the centre of the island, and at the beginning or middle of June in the low country, and continues some years to the end of October; but it has, of late years, varied much as to its commencement. The rains set in daily, during the season, about 2 o'clock P. M. descend in torrents, and often accompanied by the most awful and continual flashes of lightning, and peals of thunder. They fall in repeated showers, and in such quantities, that I have known the streets and public squares, in the space of thirty minutes, to have been rendered nearly impassable. The intense heat which immediately succeeds those showers, and continuing generally for the space of half an hour, till a new gust arises or is collecting, often renders respiration difficult, and produces or increases the epidemical diseases incidental to the climate.

The dry and temperate season is from November until May and June; and, with the interruption only of occasional northerly bleak winds (those seldom), coming over from the American continent, is, in the highest degree, mild and salubrious. No frost is experienced but on the summits of the highest hills and mountains. Eternal verdure pervades the face of the country, and an uninterrupted succession of the finest productions of the earth is offered to its cultivators.

The whole number of inhabitants of the city and suburbs of Havanna, I have estimated, from the best information I could collect (for there has been no regular census ever published) at 70,000; 45,000 being within, and 25,000 without the walls—a *proportion* confirmed by the number of births in the two districts.

An Account of the Number of Births, Marriages and Deaths in the City of Havanna, and its Suburbs, in the Island of Cuba, from January 1 *to December* 31, 1801, *as collected from the Returns of the different Parishes.*

PARISHES.	Births.	Marriages	Deaths.
Sagrario (Sanctuary) of the Holy Cathedral Church,	531	90	214
Espiritu Santo,	984	199	408
St. Cristoval,	615	105	212
Santo Angel,	481	97	156
SUBURBS, or without the Walls.			
Neustra Segnora de Guadaloupe,	563	96	232
Jesus Maria,	329	74	128
Total,	3503	661	1350

The whole number of deaths in the city and suburbs of Havanna, for that year, was 2366. Taking from this the number of deaths in the hospitals, 1016, as in the accounts which follow, leaves the number of deaths in the city, &c. generally, 1350, as stated above in the parish accounts.

An Account of the Number of Sick which were entered into the Hospitals of the City of Havanna during the Year 1801.

ROYAL HOSPITAL *of* ST. AMBROSIO, *for the Troops of the Army.*

Remaining on the sick list from the year 1800,	233
Admitted in the whole of 1801,	3612
Total,	3845

Died in the whole of 1801,	132
Cured in do.	3506
Remaining on the sick list at the close of 1801,	207
Total,	3845

This proportionate number of sick to the whole number of troops stationed at the Havanna is very great, particularly for that year, as they had not been, for a considerable time, reinforced by recruits from the mother country, who are at first much reduced by the diseases of the climate: and the return must, therefore, include the *militia* who are embodied in time of war as regular troops, and occasionally perform garrison duty.

ROYAL HOSPITAL *of* ST. JOSEPH, *for the Seamen and Marines of the Navy.*

Remaining from 1800,	609	
Admitted in 1801,	2298	
	2907	Total.
Died in 1801,	240	
Cured in 1801,	2572	
Remaining,	95	
	2907	Total.

The proportionate number of sick to the whole number in the marine department, cannot, for evident reasons, be at all ascertained; the number of seamen in port, by the nature of the service, continually varying.

HOSPITAL *of* ST. FRANCISCO DE PAULA, *for Women, founded in the Year* 1668.

Remaining from 1800,	44	
Admitted in 1801,	317	
	361	Total.
Died in 1801,	121	
Cured in 1801,	200	
Remaining,	40	
	361	Total.

The great proportion of deaths in this hospital I cannot account for; and, indeed, I found it impossible to procure from any of the hospitals a circumstantial detail of the different or most prevalent diseases which occurred.

HOSPITAL *of the* CONVENT *of* ST. JOHN *of* GOD. *(Franciscan Order.)*

Remaining from 1800,	945	
Admitted in 1801,	719	
	——1664	Total.
Died in 1801,	523	
Cured in 1801,	975	
Remaining,	166	
	——1664	Total.

The greater proportion of deaths in this hospital may be accounted for from the greater variety of diseases and circumstances under which the patients enter, arising from the indiscriminate and charitable admission of sick persons, whether natives or foreigners.

The whole charge for the American seamen which were latterly introduced into this hospital, was 50 cents *per diem* for each man, including medicines, attendance and subsistence; and they were pretty successfully treated.

Notwithstanding the severe duties of this order or hospital (not being numerous), their labours are not confined to the walls of their convent: they frequently visit sick and distressed objects abroad. The friars are early and regularly instructed in the practice of physic and surgery; and the establishment has existed so far back as 1602.

An Account of other Hospitals established in the Havanna, from which no Returns of Sick had been rendered.

ROYAL HOUSE *and* HOSPITAL *for exposed and destitute Children (Infants), founded in* 1706.

Admitted for the year 1801, 311

HOSPITAL *and* CHURCH *of* ST. LAZARO, *without the Walls, founded in* 1741.

This hospital is appropriated solely to cases of *leprosy*, of which there are many in Cuba. By the laws of the country, any person afflicted with that dreadful malady is forced to seclude himself from his family and society. Accommodations are accordingly provided; consisting of a number of houses and apartments, and a chapel, situated on the margin of the sea, and the whole enclosed by an high stone wall. The number of patients I could not accurately ascertain; but, from the best information I could procure, they amount, on an average, to about one hundred.

HOUSE *and* HOSPITAL *of* BENEFICENCE, *for destitute Female Orphans, situated without the Walls.*

The number in this institution is, on an average, about seventy. The building is very large, commodious and healthy, situated upon the sea-board. The regulations are excellent, and daily superintended by a member (in monthly rotation) from the Royal Patriotic Society, of which the Governor of the island is president.

The girls are carefully educated in useful arts, well clothed and attended, and, finally, provided for by marriage, or reputable employments, at the discretion of the trustees. Some of the trustees give a public breakfast to the orphans, at their own houses, on the close of their monthly visitation. One, given by the Marquis de Montehermoso, I attended by invitation. I never witnessed a more cheerful display of comfort, ease and contentment.

This hospital, as well as most of the others, is supported by private contributions; and it is rendering but common justice to the inhabitants of the Havanna, to say, that they exhibit many proofs of public and private beneficence.

☞ We are happy to inform our readers, that the very valuable information contained in this communication of Mr. MORTON, is only a part of what he has collected during his residence at Havanna. We understand that he is in possession of many other notes and remarks respecting that city, and the island of Cuba generally, which may be expected to meet the public eye, on a future occasion, upon the pages of the Medical Repository.

NEW WORKS OF DR. PEARSON.

Dr. Miller has just received from Dr. George Pearson, of London, a copy of each of the following works by that learned physician, viz. "Principles of Physic, to be explained in a Course of Lectures:" also, "Arranged Catalogues of the Articles of Food, Drink, Seasoning and Medicine, for the Use of Lectures on Therapeutics and Materia Medica: and "An Examination of the Report of the Committee of the House of Commons on the Claims of Remuneration for the Vaccine Pock Inoculation."

The two former are not yet published, being principally intended for the use of those who attend the author's lectures. The last is designed to invalidate Dr. Jenner's *exclusive* claim to originality and remuneration in investigating and proposing the inoculation of the vaccine disease as a substitute for small-pox.

Dr. Pearson describes, in a letter accompanying the abovementioned performances, the following simple and elegant experiment for showing the effect of Galvanism in decompounding water.—"Take a tube, about five inches long, and one

fourth or half of an inch wide, open at both ends; fill it with water, having first stopt one end with a cork: then add to the water a few drops of muriatic acid. Pierce the cork at one end with a pointed wire of zinc, so as to pass about half an inch into the tube: then pierce in like manner the cork stopping the other end, but with a *silver* wire which is long enough, and bent so as to reach to the wire in the other cork. When the two wires are not in contact, no effect is produced in the water; but when they are made to touch each other, then immediately bubbles of gas begin to rise at each point of the wires within the water, the silver wire discharging oxygen, and the zinc hydrogen gas, and the zinc is seen to oxydate very rapidly."

Dr. Pearson has been engaged in some inquiries concerning the celebrated *Nepenthe* of the Greeks. He concludes that it was not our opium, but another vegetable substance. He has lately received a quantity of a preparation possessing such powers as to bid fair to be a great acquisition to the practice of physic, and, at the same time, to elucidate some otherwise unintelligible parts of the Greek writers as to the natural history of several products.

YELLOW FEVER.

In the course of the summer and autumn this disease appeared in Philadelphia, Baltimore, and Wilmington (Delaware). Some few cases were also observed at Portsmouth (New-Hampshire), and at some other places. But in all these situations, the instances of the disease, when compared with many former seasons, were so few, and the mortality so inconsiderable, that little alarm or suspension of business were necessarily produced. We hope to obtain more particulars from those several places for a future number.

MEDICAL GRADUATION IN THE UNIVERSITY OF PENNSYLVANIA.

The following gentlemen were admitted to the degree of Doctor of Medicine in the University of Pennsylvania, on the 27th day of May, 1802, *having respectively defended and published the dissertations annexed to their names.*

1. GEORGE LOGAN, of South-Carolina, on the Hepatic State of Fever.
2. WILLIAM WASHINGTON, of Virginia, on Diabetes.
3. CHARLES MEREDITH, of Pennsylvania, on Phthisis Pulmonalis.
4. JOHN DORSEY, of Philadelphia, on the Lithontriptic Virtues of the Gastric Juice.

5. GEORGE THOMAS, of Virginia, on the Kalmia Latifolia and Angustifolia.
6. GRAFTON DUVAL, of Maryland, on the Melia Azedarach of Linnæus.
7. CHARLES MORRIS, of Virginia, on the Prunus Virginiana, or Wild Cherry-Tree.
8. PATRICK RODGERS, of Ireland, on the Liriodendron Tulipifera, or Poplar-Tree.
9. THOMAS D. PRICE, of Virginia, on the Magnolia Glauca, or White Laurel.
10. HEDGE THOMSON, of New-Jersey, on the Spigelia Marylandica, or Indian Pink.
11. THOMSON M'DONALD, of Virginia, on Cynanche Trachealis.
12. THOMAS ROWAN, of New-Jersey, on the Hydrophobic State of Fever.
13. WILLIAM NELSON, of Virginia, on the Peruvian Bark.
13. HENRY JACKSON, of Georgia, on the Efficacy of External Applications.
15. JOHN OSWALD, of South-Carolina, on the Phenomena of suspended Animal Life.
16. JOHN MARTIN, of Delaware, on the Vitality of the Blood.
17. JOHN C. GEDDY, of Virginia, on the Absorption of Medicines.
18. HUGH WHITEFORD, of Maryland, on the Catamenia.
19. JOHN MACE, of Maryland, on the Proximate Cause of Disease.
20. JOSEPH M'CRERY, of Delaware, on the Principle of Animation.
21. PETER FORSYN, of South-Carolina, on the Modus Operandi of Medicines.

MEDICAL GRADUATION IN COLUMBIA COLLEGE.

The following gentlemen were admitted to the degree of Doctor of Medicine in Columbia College, on the 9th day of November, 1802, *having defended and published the dissertations annexed to their names.*

1. NICHOLAS I. QUACKENBOS, on Dysentery, in order to illustrate the Mitchillian Doctrine of Pestilential Fluids.
2. RICHARD L. WALKER, on the Perspirable Fluids of the Human Body.

Dr. JAMES S. STRINGHAM is appointed Professor of Chemistry in Columbia College.